MONTANA DEPARTMENT OF STATE LANDS

ABANDONED MINES AND RECLAMATION BUREAU

ABANDONED HARDROCK MINE PRIORITY SITES

PROJECT REPORT

Ravalli County (Curlew District)
Through
Sweet Grass County (Independence District)

Ravalli County			
	Curlew	Curlew	PA # 41-003
	Frog Pond	Montana Prince	PA # 41-004
	Hughes Creek	Lucky Joe	PA # 41-027
	Pleasant View	Blue Bird	PA # 41-009
Sanders County			
	Blue Creek	Broken Hill	PA # 45-005
	Plains	Montro Gold	PA # 45-010
		Dee Creek	PA # 45-041
		Lower Letterman	PA # 45-047
	Trout Creek	Holliday (Silver Mark)	PA # 45-009
	White Pine	Jack Waite	PA # 45-002
Silver Bow County			
	Basin Creek	Highland Mine	PA # 47-028
	Elk Park	Mary Emmee/Clinton	PA # 47-035
		Rising Sun	PA # 47-037
	Melrose	Old Glory	PA # 47-027
		Clipper	PA # 47-029
		Maiden Rock	PA # 47-051
	Moose Creek	Middle Fork Millsite	PA # 47-081
Stillwater County			
	Nye	Mouat Mine	PA # 48-001
	Stillwater	Benbow Millsite	PA # 48-005
Sweet Grass County			
	Independence	Poorman/Emma	PA # 49-001
		Yager/Daisy	PA # 49-002
		NE SE S22	PA # 49-003

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CURLEW

RAVALLI

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CURLEW

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: CURLEW PA#: 41-003

Date: September 9, 1993 Time: 0900-1600

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Clear; calm; warm (80°F); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #21: Open cut, gravel pit, and highwall; #22: Open pit and SW-1 sample location; #23: WR-1; #24: TP-1 and TP-2; #25: WR-3 and WR-5.
Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Spring surface water sampling is recommended due to complex runoff paths all dry at the time of this investigation. Illegal garbage dump is present on the north end of TP-1.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Study potential water quality impacts and treatment alternatives. Grade, amend, and revegetate waste dumps. Reclaim glory hole and gravel pit area.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): CURLEW PA#: 41-003

Legal Description: T 8N ;R 21W ;Sec. 14 , NE1/4 ___1/4 ___1/4

County: RAVALLI Mining District: CURLEW

Latitude: N 46° 27' 49" Longitude: W 114° 10' 45"

Primary Drainage Basin and Code: Bitterroot River/17010205
Secondary Drainage Basin: Big Creek

USGS Quadrangle map name(s): Victor

Mine Type/Commodities: Hardrock/Gold, Silver, Lead, Copper, Zinc

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N___; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Delmar Buckallew, 4263 Burro Lane, Stevensville, MT 59870. (406) 777-3179.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 3600'-3900' , Slope 5°-40° , Aspect Southeast

Land use: Mining___, Recreational___, Residential X , Urban___, Agricultural X , Other(Specify)___

Area of disturbed/unvegetated lands? 16 acres.
Dimensions:___

Predominant vegetation types: Ponderosa pine, cottonwoods, knapweed

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 82 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is located in the hills of the Bitterroot Mountains above Big Creek, a tributary to the Bitterroot River. The mine is located in a region of moderately structural deformations characterized by an east-west trending fold, which has been intruded by a small Alaskite stock. The ore bodies of the Curler formed by mineralizing hydrothermal solutions circulating along channels formed in the limbs and axis of the east-west trending limestone beds of the Wallace Formation.

Mining/milling history, ore type/tenor, host rock, gangue: Originally, development began in 1887. By 1906, a 120-ton concentrator was operational on the site. The last recorded production occurred in 1949. Records show production of 69,000 tons of ore containing approx. 4,500 oz. of gold. A later report indicated the open pit operation began in 1967 with no production or milling information. The ore deposits occur as veins consisting mainly of argentiferous galena carrying some disseminated sphalerite, along with several massive veins of quartz and pyrite.

Mine Operation?
Shafts - Yes___, No_X_, #____, Comment Historically present
Adits - Yes_X_, No___, #_2_, Comment Open
Pits - Yes_X_, No___, #_3_, Comment 2 large; 1 small
Placers - Yes___, No_X_, #____, Comment
Other - Yes_X_, No___, #_1_, Comment Gravel pit

Mill Operation? Yes_X_, No____. If yes answer the next three questions:

Period(s) of Operation: 1906 to 1949; Possibly in 1967

Origin of Ore Milled - Custom Mill___ Dedicated Mill_X_; Number and names of mines that supplied mill feed:

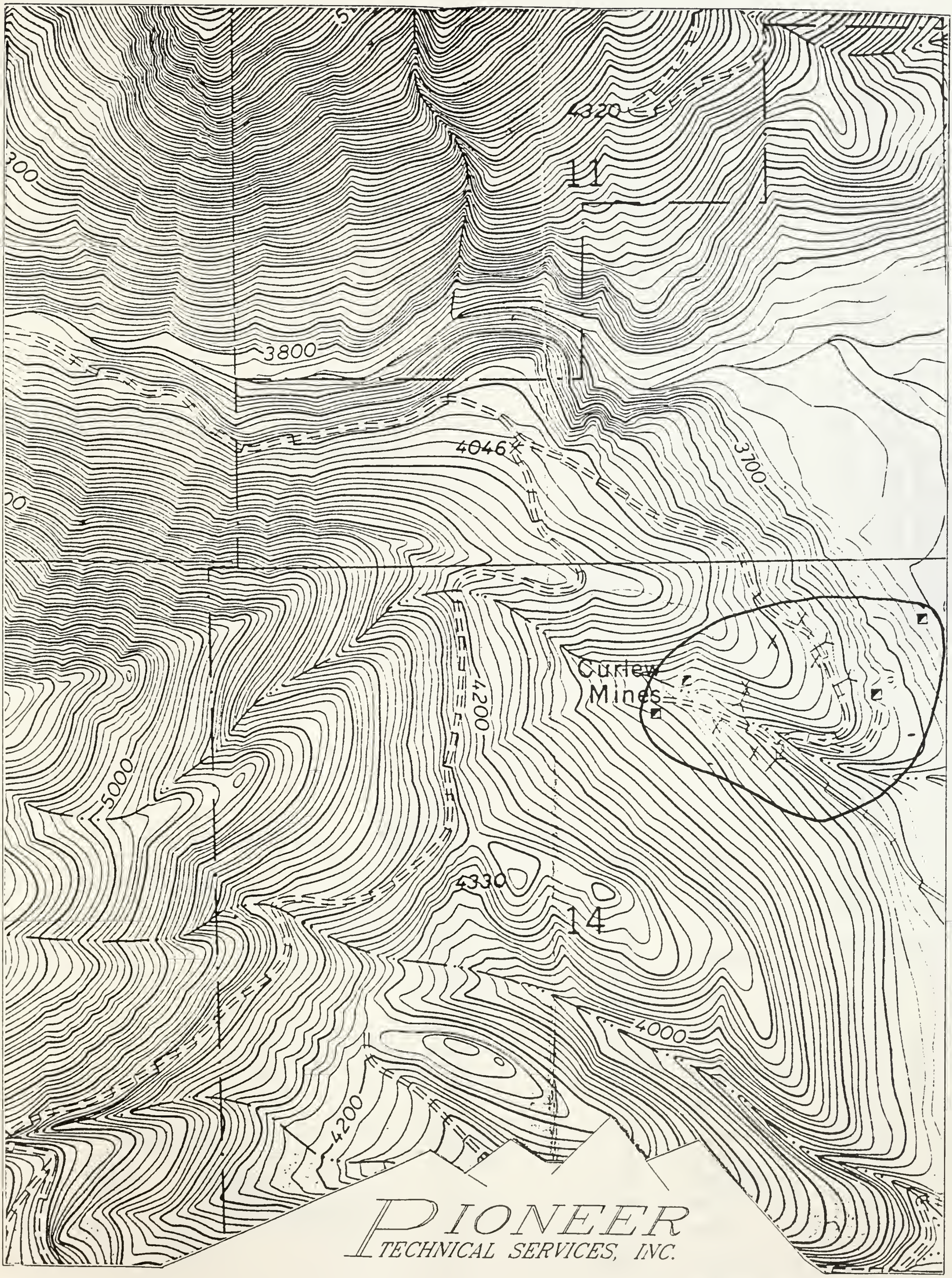
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Floatation

Montana Bureau of Mines and Geology
Water Well Log Data

11/15/1993

Well No.	Location	Depth	Yield	Static Water Level
M:58258	08N 21W 11	50.0	40.0	22.00
M:58257	08N 21W 11	18.0	200.0	0.00
M:58259	08N 21W 11 DB	14.0	100.0	4.00
M:58261	08N 21W 12	28.0	20.0	8.00
M:58260	08N 21W 12	46.0	8.0	21.00
M:122207	08N 21W 12	32.0	10.0	12.00
M:58264	08N 21W 12	36.0	10.0	17.00
M:58266	08N 21W 12	30.0	25.0	8.00
M:58262	08N 21W 12	28.0	30.0	6.00
M:58263	08N 21W 12	50.0	30.0	18.00
M:58265	08N 21W 12	29.0	0.0	10.00
M:58269	08N 21W 12 A	121.0	7.0	45.00
M:58268	08N 21W 12 A	20.0	6.0	15.00
M:58270	08N 21W 12 A	30.0	20.0	4.00
M:58267	08N 21W 12 A	111.0	10.0	33.00
M:58271	08N 21W 12 BD	44.0	12.0	12.00
M:58272	08N 21W 12 BDD	55.0	80.0	10.00
M:58273	08N 21W 12 C	28.0	40.0	5.00
M:58274	08N 21W 12 CA	28.0	15.0	6.00
M:58277	08N 21W 12 CAD	29.0	20.0	7.00
M:58276	08N 21W 12 CAD	29.0	20.0	8.00
M:58278	08N 21W 12 CAD	29.0	20.0	7.00
M:58275	08N 21W 12 CAD	29.0	20.0	6.00
M:58279	08N 21W 12 CB	29.0	15.0	6.00
[illegible]3781	08N 21W 12 CCA	40.0	30.0	8.00
[illegible]58280	08N 21W 12 D	100.0	5.0	25.00
M:58281	08N 21W 12 DB	15.0	75.0	0.00
M:58282	08N 21W 12 DB	39.0	30.0	17.00
M:58283	08N 21W 12 DBD	40.0	30.0	15.00
M:58284	08N 21W 12 DC	29.0	15.0	10.00
M:58285	08N 21W 13	29.0	90.0	6.00
M:58286	08N 21W 13	73.0	5.0	33.00
M:58287	08N 21W 13 A	29.0	20.0	9.00
M:121470	08N 21W 13 AB	59.0	20.0	8.00
M:58288	08N 21W 13 ADC	50.0	15.0	10.00
M:58289	08N 21W 13 BD	59.0	4.0	9.00
M:58290	08N 21W 13 CB	110.0	30.0	60.00
M:58291	08N 21W 13 CBB	84.0	10.0	54.00
M:58292	08N 21W 13 CC	80.0	30.0	30.00
M:58294	08N 21W 13 CD	15.0	224.0	0.00
M:58295	08N 21W 13 CD	83.0	10.0	44.00
M:58293	08N 21W 13 CD	55.0	10.0	34.00
M:58296	08N 21W 13 DB	46.0	30.0	27.00
M:58297	08N 21W 13 DD	38.0	20.0	18.00
M:58298	08N 21W 13 DD	42.0	50.0	0.00
M:58304	08N 21W 22 D	75.0	0.0	0.00
M:131261	08N 21W 22 D	380.0	3.0	130.00
M:58305	08N 21W 22 D	43.0	3.0	8.00
M:58306	08N 21W 22 DA	420.0	5.0	50.00
M[illegible]308	08N 21W 22 DD	40.0	5.0	7.00
[illegible]58309	08N 21W 22 DD	200.0	0.0	0.00
M:58307	08N 21W 22 DD	31.0	10.0	8.00
M:58310	08N 21W 23	122.0	8.0	60.00
M:58311	08N 21W 23	48.0	20.0	31.00
M:58312	08N 21W 23 BBD	80.0	7.0	58.00

Well No.	Location	Depth	Yield	Static Water Level
M:58313	08N 21W 24	99.0	20.0	74.00
M:58320	08N 21W 24	109.0	5.0	62.00
M:58317	08N 21W 24	90.0	6.0	40.00
M:58319	08N 21W 24	49.0	40.0	20.00
M:58315	08N 21W 24	49.0	50.0	30.00
M:58321	08N 21W 24	72.0	7.0	44.00
M:58322	08N 21W 24 AA	112.0	20.0	55.00
M:58323	08N 21W 24 AAC	38.0	16.0	26.00
M:128783	08N 21W 24 ABB	38.0	7.0	8.00
M:130865	08N 21W 24 ABC	80.0	15.0	38.00
M:128782	08N 21W 24 AD	32.5	20.0	14.00
M:58324	08N 21W 24 AD	48.0	30.0	32.00
M:58326	08N 21W 24 BB	118.0	20.0	65.00
M:58325	08N 21W 24 BB	100.0	10.0	55.00
M:58327	08N 21W 24 BD	30.0	15.0	24.00
M:58328	08N 21W 24 CA	100.0	12.0	50.00
M:58329	08N 21W 24 D	128.0	8.0	28.00
M:124507	08N 21W 24 DA	123.0	30.0	10.00
M:58330	08N 21W 24 DA	67.0	5.0	10.00
M:58331	08N 21W 24 DBC	62.0	20.0	44.00
M:121471	08N 21W 24 DC	169.0	30.0	18.00
M:58332	08N 21W 24 DCA	69.0	18.0	26.00
M:130864	08N 21W 24 DCB	160.0	10.0	75.00
M:58333	08N 21W 24 DD	45.0	40.0	14.00
M:58316	08N 21W 24	95.0	15.0	10.00
M:58314	08N 21W 24	58.0	10.0	42.00
M:58318	08N 21W 24	87.0	15.0	23.00

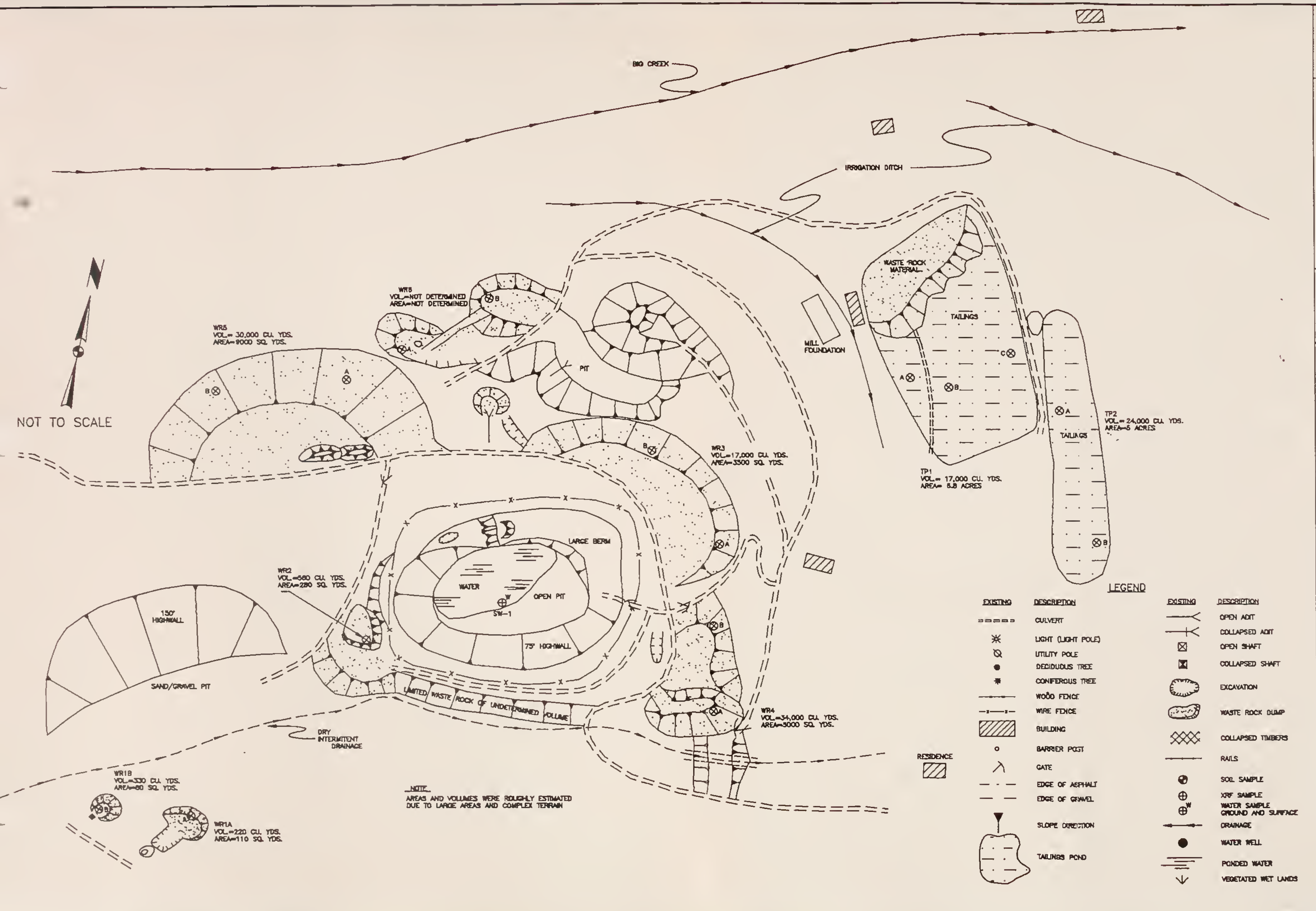


PIONEER
TECHNICAL SERVICES, INC.

CURLEW, P.A. NO. 41-003

T08N, R21W, SECTION 14

SCALE: 1" = 1000'



DRAWN JTP DATE 1 DEC 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

CURLEW PA# 41-003
CURLEW DISTRICT RAVALLI COUNTY

SHEET NO.

41-003.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Tailings appear to be mainly medium to coarse sand with lesser fraction of silts and clays.

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Tailings impoundment ranges from 1 to 4 feet deep with a small reduced zone located on the eastern side of TP-2.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Tailings are mostly dry with moist zone only in the deep areas.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Impoundments are broken down and breached.

Comments on potential for mitigation: Consolidation in proper repository or possible amendment and revegetation.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	220	S side of dump with trench cut; tan sand	None	6.8 (D)	0.03	41-003-WR-1	09/13/93 1315	T-Metals, ABA
WR-1B	WR	330	S side of dump assoc. with shaft; tan sand	None	6.4 (D)	0.04			
WR-2	WR	560	Dump above and E of open pit; dark brown coarse sand	None	6.3 (D)	0.04			
WR-3A	WR	17,000	S end of large dump NE of open pit; dark brown sand	None	6.0 (D)	0.035			
WR-3B	WR		N end; dark brown sand	None	6.0 (D)	0.03			
WR-4A	WR	34,000	S end of dump E of open pit; dark brown sand	None	6.5 (D)	0.03	41-003-WR-2	09/13/93 0925	T-Metals, ABA
WR-4B	WR		N end; dark brown sand	None	6.2 (D)	0.04			
WR-5A	WR	30,000	E end of large dump NW of pit; brown sand	None	6.6 (D)	0.03			
WR-5B	WR		W end; brown sand	None	6.5 (D)	0.05			
WR-6A	WR	ND	Series of cuts and dumps directly N of large pit	None	5.9 (D)	0.04			
WR-6B	WR		Series of cuts and dumps directly N of large pit	None	4.8 (D)	0.045			
TP-1A	TAIL	17,000	W side of pond near mill; 0-2', tan silt	None	NM	NM	41-003-TP-1	09/13/93 0925	T-Metals, ABA
TP-1B	TAIL		Center of pond near mill; 0-8", tan sand	None	5.8 (D)	0.03			
TP-1C-A	TAIL		E side of pond near mill; 0-0.5', brown sand	None	6.8 (D)	0.02			
TP-1C-B	TAIL		0.5-2.5', tan sand	None	NM	NM			
TP-1C-C	TAIL		2.5-4', gray moist clay	None	< 3.5 (D)	0.03			
TP-2A	TAIL	24,000	N end of TP-2; 0-2.5', medium sand	None	6.4	0.01	41-003-TP-2	09/13/93 0925	T-Metals, ABA
TP-2B-A	TAIL		S end of TP-2; 0-0.3', brown sand	None	NM	NM			
TP-2B-B	TAIL		0.3-2', brown sand	None	< 3.5 (D)	0.02			
TP-2B-C	TAIL		2-2.5', dark brown sand	None	NM	NM			

*D Direct reading(Selwey Meter); S Saturated Paste(Orion Meter)

Comments or deviations from SOPs: Volumes are roughly estimated due to large areas and complex terrain; ND = Not Determined. 41-003-WR-1 is composite of WR-1A and -1B, WR-2, and WR-3A and -3B. 41-003-WR-2 is composite of WR-4A and -4B, WR-5A and -5B, and WR-6A and -6B. 41-003-TP-1 is composite of TP-1A and -1B, and TP-1C-A through -1C-C. 41-003-TP-2 is composite of TP-2A and TP-2B-A through -2B-C. NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:__________

Filled shafts: Yes___, No_X_, Number:____ Identification:__________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:__________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 946

Distance to nearest well used for drinking? Approx. 1/3 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Extensive workings and disturbed soils with elevated metal concentrations may cause contamination.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC μS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Big Creek

Dry streambeds: Yes X , No ___, Name(s): Intermittent tributary to Big Creek

Other surface water: Yes X , No ___, Name(s)/Description: An irrigation ditch across hillside between mine and tailings; another irrigation ditch is north of TP-2. Large pond in the Glory Hole sampled as SW-1.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): No wastes in floodplain of Big Creek; WR-4 is located in an intermittent drainage.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0 during investigation
High Flow: Approx. 2.5 cfs , Average Flow: < 0.25 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; Pond is in Glory Hole. 0 feet; WR-1 is in intermittent drainage.

Surface water draining onto or through waste sources: Yes ___, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, stock watering, fishery, wetlands, T&E - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X , Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Pond in bottom of Glory Hole	8.71	NM	234	NM	37	0	41-003-SW-1	09/13/93 1045	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 20+ acres in valley bottom adjacent to tailings

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Limestone beds of the Wallace Formation

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000 X ; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1/3 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1A	None	Dry	990	200	No	Low - crust
WR-1B	None	Dry	720	0	No	Low - crust
WR-2	FEOX	Dry	2,500	2,500	Yes	Low - crust
WR-3	FEOX	Dry	31,500	31,500	Yes	Low - crust
WR-4	FEOX	Dry	45,000	45,000	Yes	Low - crust
WR-5	FEOX	Dry	81,000	64,800	Yes	Low - crust
WR-6	FEOX; Low pH	Dry	ND	100%	Yes	Low - crust
TP-1	ESD	Dry	296,200	177,700	Yes	Moderate
TP-2	ESD; Low pH	Dry	218,000	130,800	Yes	Moderate

Notes and Clarifications: Areas are roughly estimated due to large areas and complex terrain; ND = Not Determined

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_,
Describe:_____

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_____

Evidence of recreational use on site: Yes_X_, No___, Describe: Litter in the Glory Hole

Accessibility - Fences, warning signs, closed roads? The Glory Hole is fenced and posted. A public road goes through much of the site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment_____
Wilderness Area - Yes_X_, No___, Comment Bitterroot (2 miles)
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes_X_, No___, Comment Open adits

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _2_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:
Adits

Hazardous structures: Yes_X_, No___, Number_2_, types and locations:
Old house and out building near mill foundation

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_2_, types and locations: Large highwall associated with Glory Hole and gravel pit areas

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:_____

Bibliography

MBMG, Curlew Mine, Ravalli County, Form 39, 1968, 1971-1973, and 1976-1984.

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957, pp. 47-50.

MBMG, State Technical Services Mine Visit Report, Author Unknown, December 27, 1967.

MBMG, Summary Sheet, State Technical Services Mine Visit Program, Author Unknown, January 4, 1968.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Curlew, Prepared by Chen-Northern, July 8, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Curlew, Prepared by Daphne Digrindakis, May 14, 1985.

MDSL/AMRB Files, Department of the Interior, Office of Surface Mining, Abandoned Mine Lands Inventory Update Form for Curlew, Prepared by L.C. Hanson Company, December 10, 1985.

MDSL/AMRB Files, Geology of the Curlew Mining District, Ravalli County, Montana, MBMG Photocopy Reproduced by permission of Russell Scrugg, Date Unknown.

USGS, Topographic Map, Victor, Montana, 7 1/2 minute Quadrangle, 1967.

LABORATORY ANALYTICAL DATA

CURLEW
PA NO. 41-003

Curlew PA# 41-003
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 09/09/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
41-003-TP-1	3160	6.12	47.5	2.21	5.77	749	76100	0.163 J	29600	31.8	4450	33.1 J	20300	NR
41-003-TP-2	1640	10.5	39.6	2.89	5.66	286	74900	0.068 J	32000	33.3	3140	27 J	18300	NR
41-003-WR-1	692	53.4	1.3	4.65	4.91	11.8	27600	0.090 J	8790	16	509	4.74 UJ	1930	NR
41-003-WR-2	48.3	1000	0.9 U	2.39	3.52	13	31200	0.439 J	508	8.33	32.7	5.94 UJ	86.8	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
41-003-TP-1	1.07	33.4	81	47.6	<0.01	0.59	0.53	18.4	62.6
41-003-TP-2	0.61	19.1	121	102	<0.01	0.25	0.4	7.81	113
41-003-WR-1	0.27	8.43	145	136	0.03	0.1	0.14	3.12	141
41-003-WR-2	0.59	18.4	259	240	0.04	0.05	0.5	1.56	257

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
41-003-SW-1	7.18 JX	17.8	2.57 U	9.7 U	6.83 U	1.55 U	27.9	0.13	35.8	16	3.82	30.7 UJX	47.5	528

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
41-003-SW-1	835	< 5.0	560	< 0.05	NR

LEGEND

TP1 – Composite of subsamples TP1A, 1B, 1C-A, 1C-B, and 1C-C.
TP2 – Composite of subsamples TP2A, 2B-A, and 2B-C.
WR1 – Composite of subsamples WR1A_B, 2, 3A, and 3B.
WR2 – Composite of subsamples WR4A, 4B, 5A, 5B, 6A, and 6B.
BACKGROUND – From the Mill Creek Mine (32-049-SS-1).
SW1 – Pond in bottom of Glory Hole.

XRF ANALYSIS RESULTS

CURLEW
PA NO. 41-003

Mine Name: Curlew PA# 41-003
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
41-003-TP1C-A		8066.9	21478.7	590.592		30089.1	63802.2		595.554	12305.8	1139.39	34.8537
41-003-TP1C-B		8696.7	21038.6	617.927	194.436 *	41309.4	80683.2		376.366	11016.3	1259.54	30.6611
41-003-TP1C-C		16979.7	24978.8	950.149		33362.6	69941.7		263.379 *	25312.5	1954.28	39.2175
41-003-TP1-A		15555.9	32017.3	1146.79		38160.9	81182.9		432.382	12083.2	1793.92	52.722
41-003-TP1-B		6866.24	8067.76	575.497		9397.12	35883.9		1259.87	12495.4	514.107	32.0924
41-003-TP2B-A		14392.8	38423.1	1103.07		31114.1	62886.7		225.695	5679.9	584.303	48.4907
41-003-TP2B-B		12165.6	30019.6	907.306		20029.2	42191.8		258.781	8077.98	569.379	41.5507
41-003-TP2B-C		9049.23	33412.4	747.476		32197.8	65642.2		252.714	8511.86	1219.22	48.0902
41-003-TP2-A		8664.36	31076.5	702.123		39685.4	74237.1		151.661 *	25816.7	1296.21	42.3379
41-003-TP-1-COMP		8299.39	16796.8	549.016		27958.2	59255.9		615.115	13687.3	953.157	23.4239 *
41-003-TP-2-COMP		10742.7	30216.4	763.001		33602.7	64770.1		172.592 *	10846.7	1056.85	43.2743
41-003-WR1-A		16043.6	51450.9	2048.01		2611.88	19456.9		42.9107 *	285.677		66.8612
41-003-WR1-B		31090.4	21075.6	1813.18		659.008 *	23926.1			121.71 *		413.656
41-003-WR3-A		21165.4	29867.7	1731.76		23031.4	48770.6		58.2106 *	3224.8	160.194 *	99.1644
41-003-WR3-B		18776.3	28237.3	1279.64		21816.2	46756.3		52.8041 *	1798.72	112.666 *	65.8746
41-003-WR4-A		20810.6	21414.1	1093.64	206.841 *	40629.9	59030.3		79.7503 *	4720.87	134.596 *	50.5144
41-003-WR4-A-DUP		22801	22344.4	1117.8		43070.9	61092.5			4686.74	82.9788 *	53.7298
41-003-WR4-B		21717.8	23485.5	1312.87	141.481 *	29923.8	52665.3		60.434 *	2881.67	79.7473 *	68.8509
41-003-WR5-A		20997.9	10893.1	2822.16		494.394 *	32554			123.209 *		702.488
41-003-WR5-B		19275.4	27322	1524.63	160.631 *	11990.7	29085			873.291		191.63
41-003-WR6-A		15296	7935.66	1269.9		13570.7	44116.2		560.476	6203.02	186.098 *	128.805
41-003-WR6-B		10159	4560.74	1588.72		7602.99	65538.4		1363.27	11348.3	170.31 *	17.3367 *
41-003-WR-1-COMP		21800.8	28521.7	1879.75	155.596 *	10841.7	32270			961.253		205.476
41-003-WR-2		25320.3	17062.6	2187.28		18385.9	40223.1		53.1798 *	1551.14	73.9313 *	245.136
41-003-WR-2-COMP		18384.2	13816.2	1811.98		14840.3	44633.3		285.468	4113.89		252.925

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
41-003-TP1C-A	78.3433		6.4556 *	2134.15	61.7055				153.11 *		9.6934 *
41-003-TP1C-B	95.1952			1703.73	75.6113				111.76 *		
41-003-TP1C-C	84.9099			4627.49	91.3229	275.534 *			203.644 *		14.0513 *
41-003-TP1-A	86.5457			5198.25	116.884	214.065 *			248.603 *		
41-003-TP1-B	69.9547		7.38941 *	3683.1	55.3574				88.2132 *		14.6909 *
41-003-TP2B-A	129.242			1722.29	80.121			40.6213 *			11.1038 *
41-003-TP2B-B	72.2613			2305.5	86.803			26.6807 *	190.001 *		12.469 *
41-003-TP2B-C	108.287			2956.9	75.5356				176.325 *		15.7457 *
41-003-TP2-A	81.9676			1566.65	57.0154 *				134.372 *		
41-003-TP-1-COMP	81.3749		5.60572 *	3053.2	72.2499				110.081 *		11.9388 *
41-003-TP-2-COMP	103.76			1967.27	81.0041			21.2585 *			
41-003-WR1-A	231.26	35.4129 *		30.4559 *	130.172			299.771	90.5874 *	10.2181 *	15.7728 *
41-003-WR1-B	183.39			179.742				1070.48			13.7722 *
41-003-WR3-A	143.293	42.8168 *		1088.23	133.869			150.278	180.545 *		7.78103 *
41-003-WR3-B	125.015			459.516	135.139			59.9392 *			8.92501 *
41-003-WR4-A	193.255		7.10923 *	596.354	142.119				130.305 *		11.2315 *
41-003-WR4-A-DUP	206.762		7.12948 *	625.158	161.269	183.139 *					10.1223 *
41-003-WR4-B	162.116	38.6274 *		669.776				40.1625 *			
41-003-WR5-A	187.498				105.881			1082.78		11.07 *	11.0245 *
41-003-WR5-B	179.202			239.247	117.05			202.88		10.8471 *	9.9534 *
41-003-WR6-A	146.541		8.29367 *	1121.93	113.193			254.948			12.1297 *
41-003-WR6-B	92.3684		7.60079 *	2353.81	71.5						9.79387 *
41-003-WR-1-COMP	154.997			239.033	147.52			391.049			12.7024 *
41-003-WR-2	182.85			254.702	133.683			279.886			11.8346 *
41-003-WR-2-COMP	149.077			895.249	115.131			296.669		10.0301 *	

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

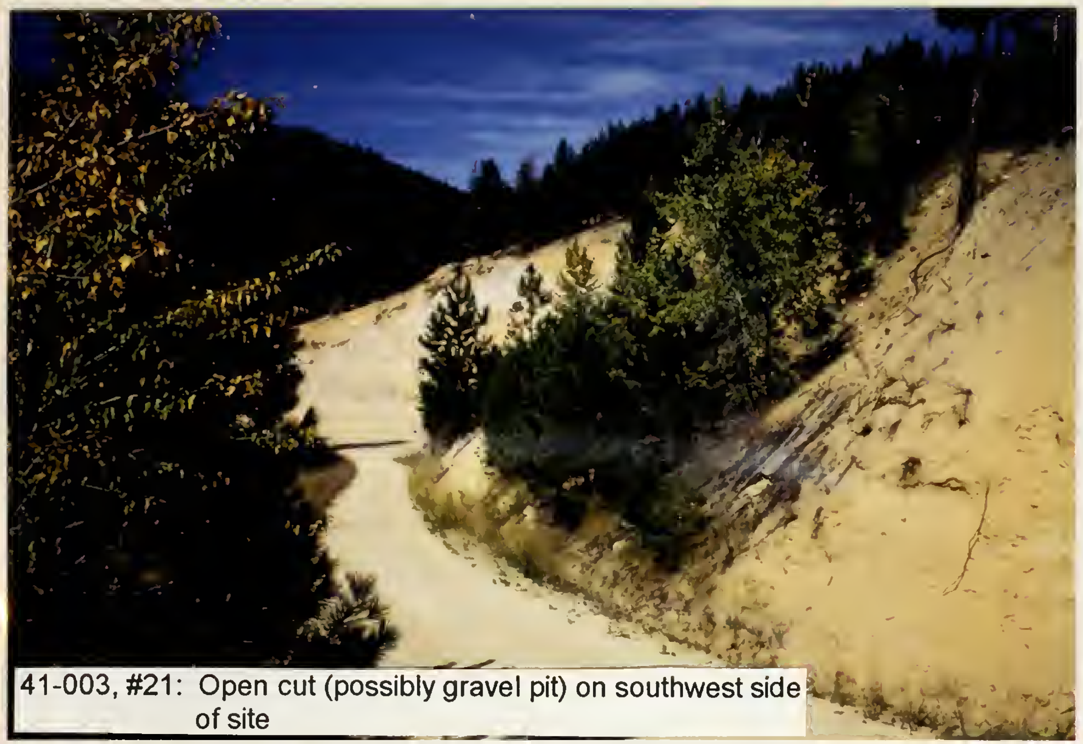
CURLEW
PA NO. 41-003

AIMSS SCORESHEET

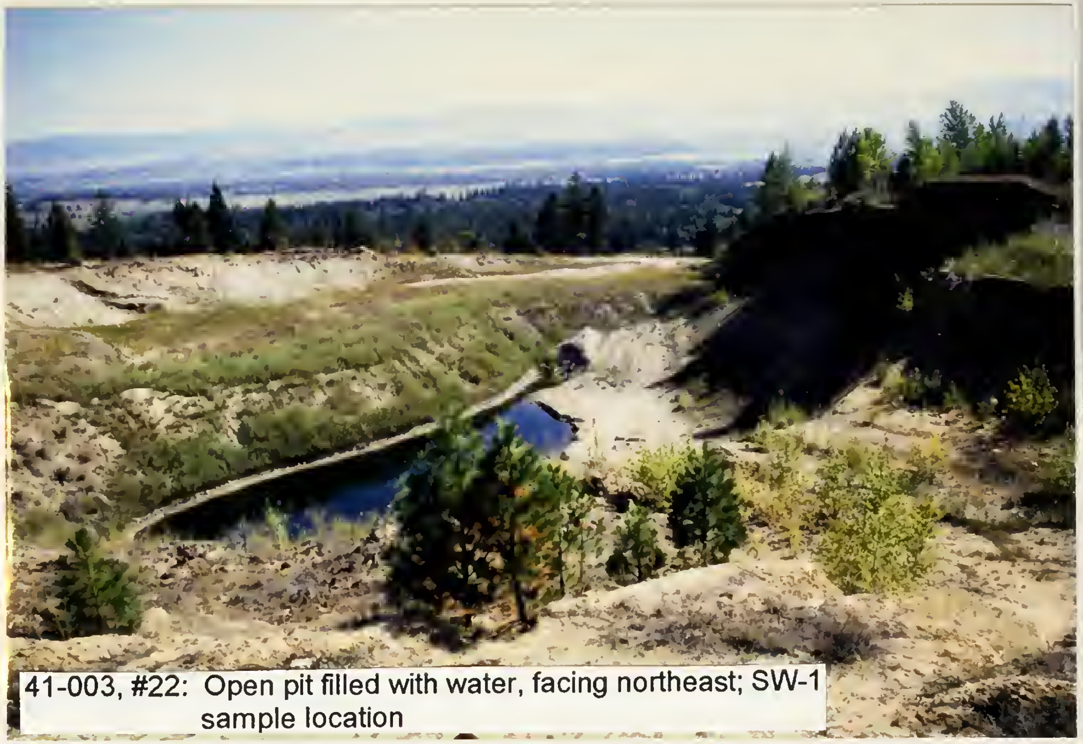
SITE NAME: CURLEW
PA NUMBER: 41-003

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	139.314
6	GW - TARGETS	WELLS - 1 MI. x 2.5		205.0
7		WELLS - 1 TO 4 MI		864
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	1074.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	59849294
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	150.145
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		10
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	32
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	1921856
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	150
27		LIKELIHOOD SCORE	LINES 25 + 26C	150
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	13.719
29	AIR - TARGETS	POPULATION - 4 MILES		300
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	320
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	658512
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	12.743
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	37
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	70724
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**625.00**

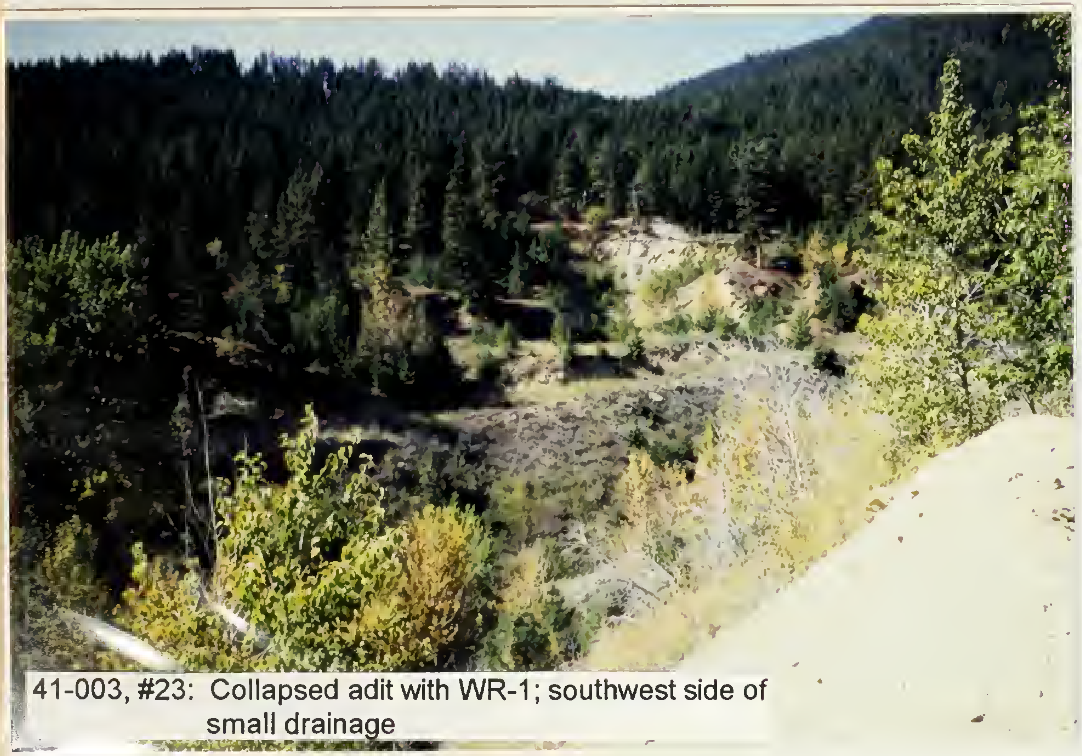
			SITE NAME:	CURLEW
			PA NUMBER:	41-003
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	330
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	37
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**122.10**



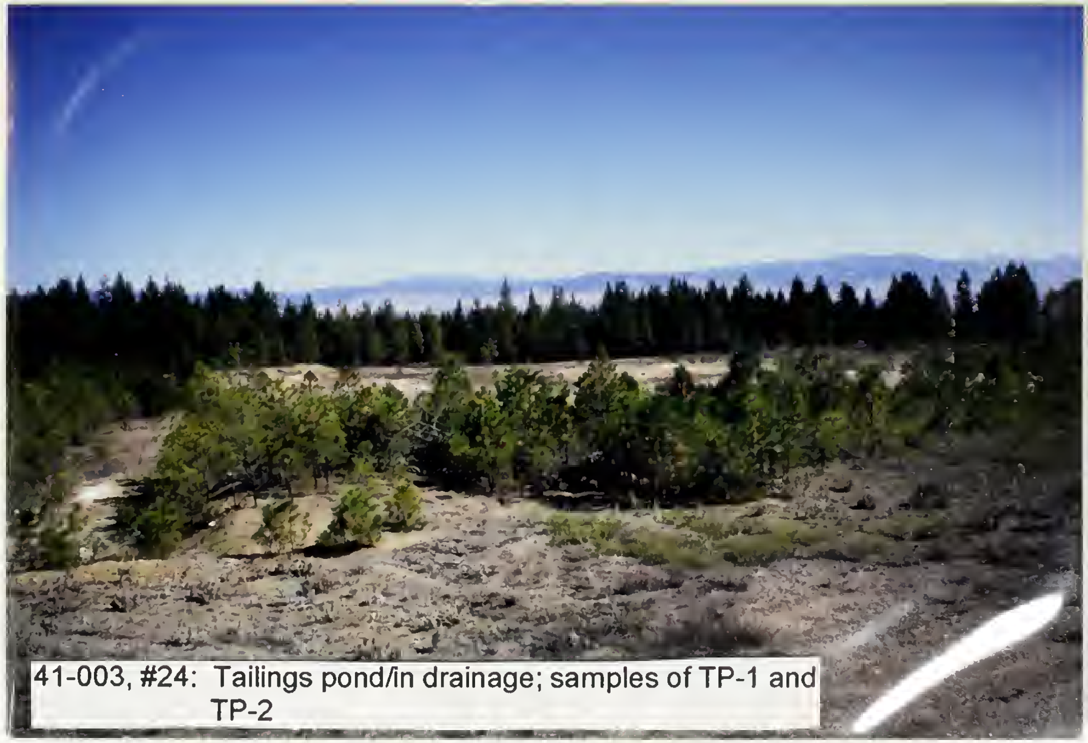
41-003, #21: Open cut (possibly gravel pit) on southwest side of site



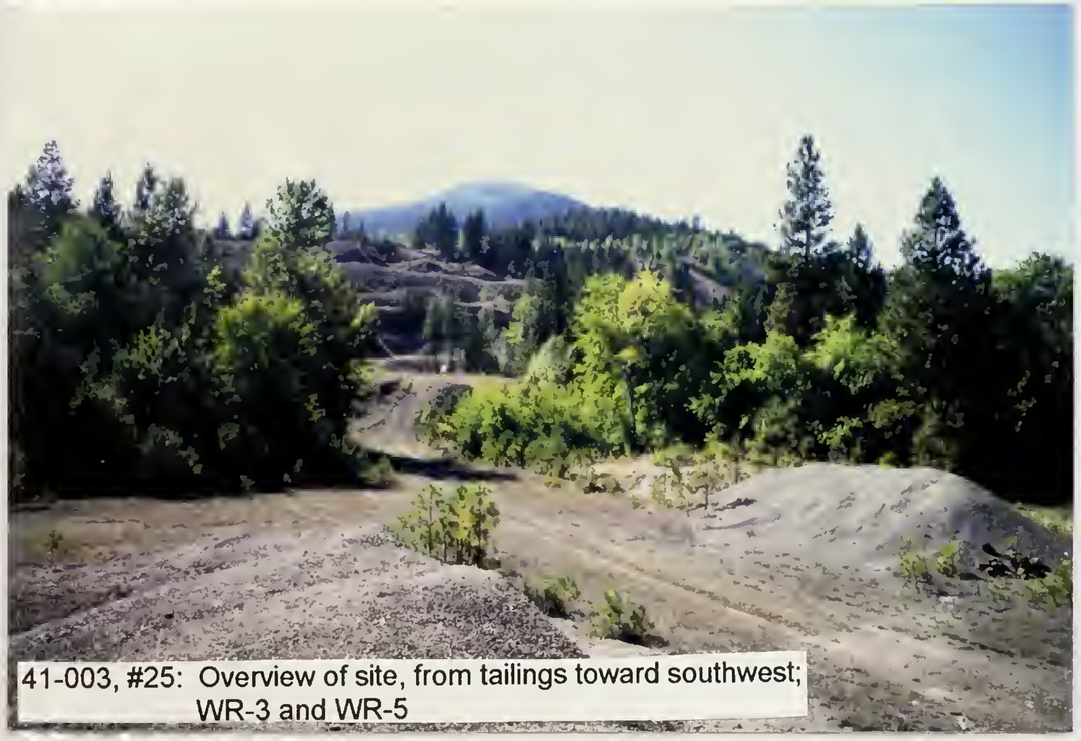
41-003, #22: Open pit filled with water, facing northeast; SW-1 sample location



41-003, #23: Collapsed adit with WR-1; southwest side of small drainage



41-003, #24: Tailings pond/in drainage; samples of TP-1 and TP-2



41-003, #25: Overview of site, from tailings toward southwest;
WR-3 and WR-5

FROG POND

HUGHES CREEK

PLEASANT VIEW

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: MONTANA PRINCE PA#: 41-004

Date: June 22, 1993 Time: 1345

Field Team Leader: Flammang, Pioneer

Sampling Personnel: Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Windy; cold; intermittent snow.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: Toe of WR-1 and SW-1 and SE-1 sample locations; #2: Collapsed Adit #1, GW-1 sample location; #3: Aerial view of the site, looking east towards the site. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): Site can only be reached by foot; small trail to site begins on a ridge from a house approximately 1/4 mile away.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Grade, amend, and revegetate the waste rock dump.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MONTANA PRINCE PA#: 41-004

Legal Description: T 3N ;R 17W;Sec. 14 , NE1/4 NW1/4 ___1/4

County: RAVALLI Mining District: FROG POND BASIN

Latitude: N 46° 00' 51" Longitude: W 113° 40' 55"

Primary Drainage Basin and Code: Moose Creek/17010205
Secondary Drainage Basin: Cuba Creek

USGS Quadrangle map name(s): Whetstone Ridge

Mine Type/Commodities: Hardrock/Gold, Silver, Copper, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Robert Kembel, 530 Grove, Missoula, MT 59801. (406) 549-6151; Bitterroot National Forest.

Relationship to other mines/sites in the area/district: Lies between Miller mine and Lutz mine, both are fissure fillings in shear zone; therefore, Montana Prince is most likely on same zone.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7150', Slope 15°,
Aspect Southwest

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.25 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine forest

Access: roads - good___,poor___,4wd___,trail X .
Other logistical considerations (proximity to other sites). Must hike to workings. Near Lutz and O'Brien mines.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by granite of Sapphire Batholith. Adit #1 drains into unnamed perennial tributary of perennial Moose Creek, which drains south.

Mining/milling history, ore type/tenor, host rock, gangue: No record of production from mine. Most likely mineralization was fissure filling quartz sulfide veins in sheer zones. The minerals present include galena, pyrite, sphalerite and occasional chalcopyrite.

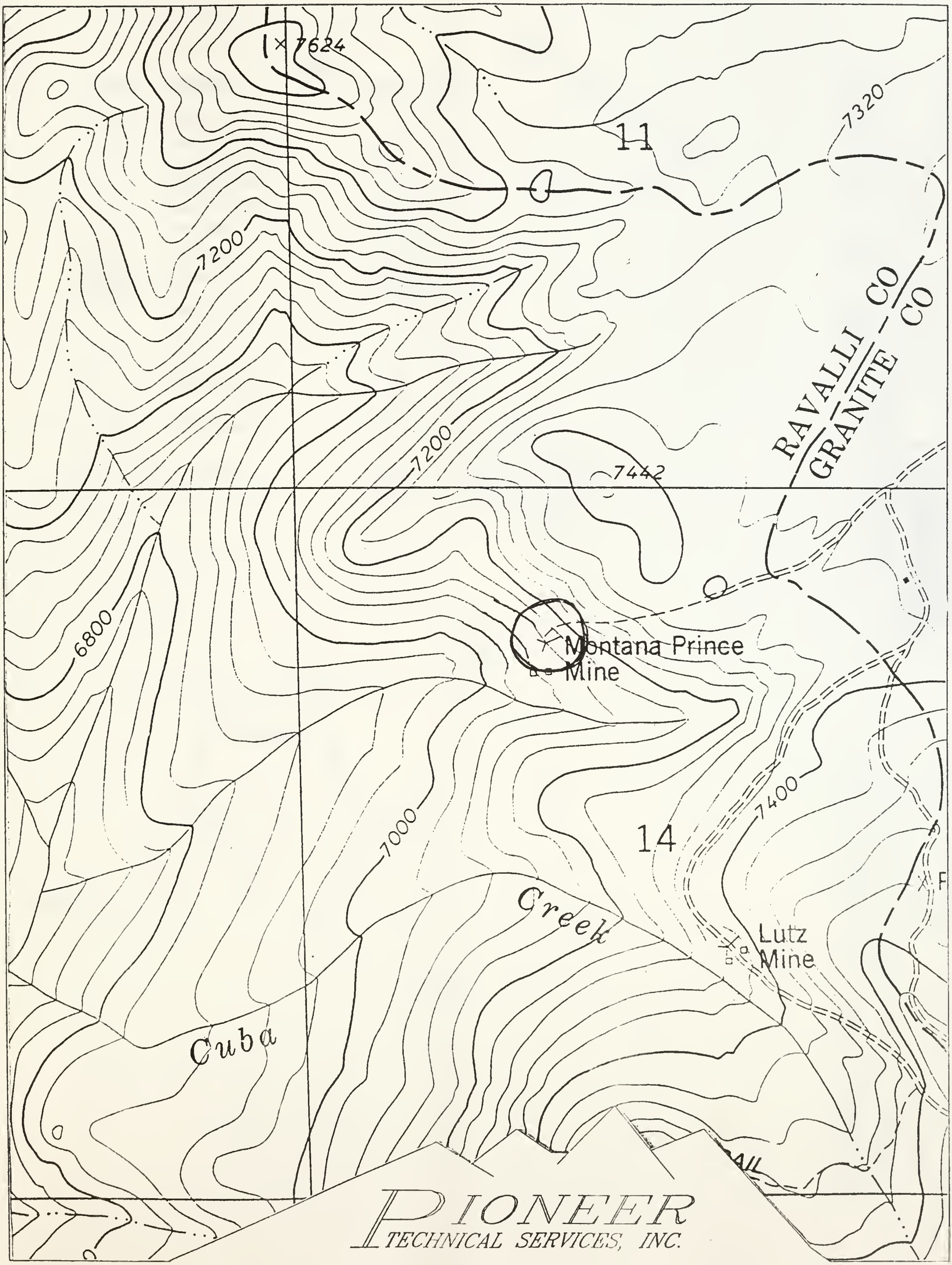
Mine Operation?
Shafts - Yes ___, No X, # ___, Comment ___
Adits - Yes X, No ___, # 1, Comment Caved and sealed
Pits - Yes X, No ___, # 1, Comment 3"x3" opening, 5' deep
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

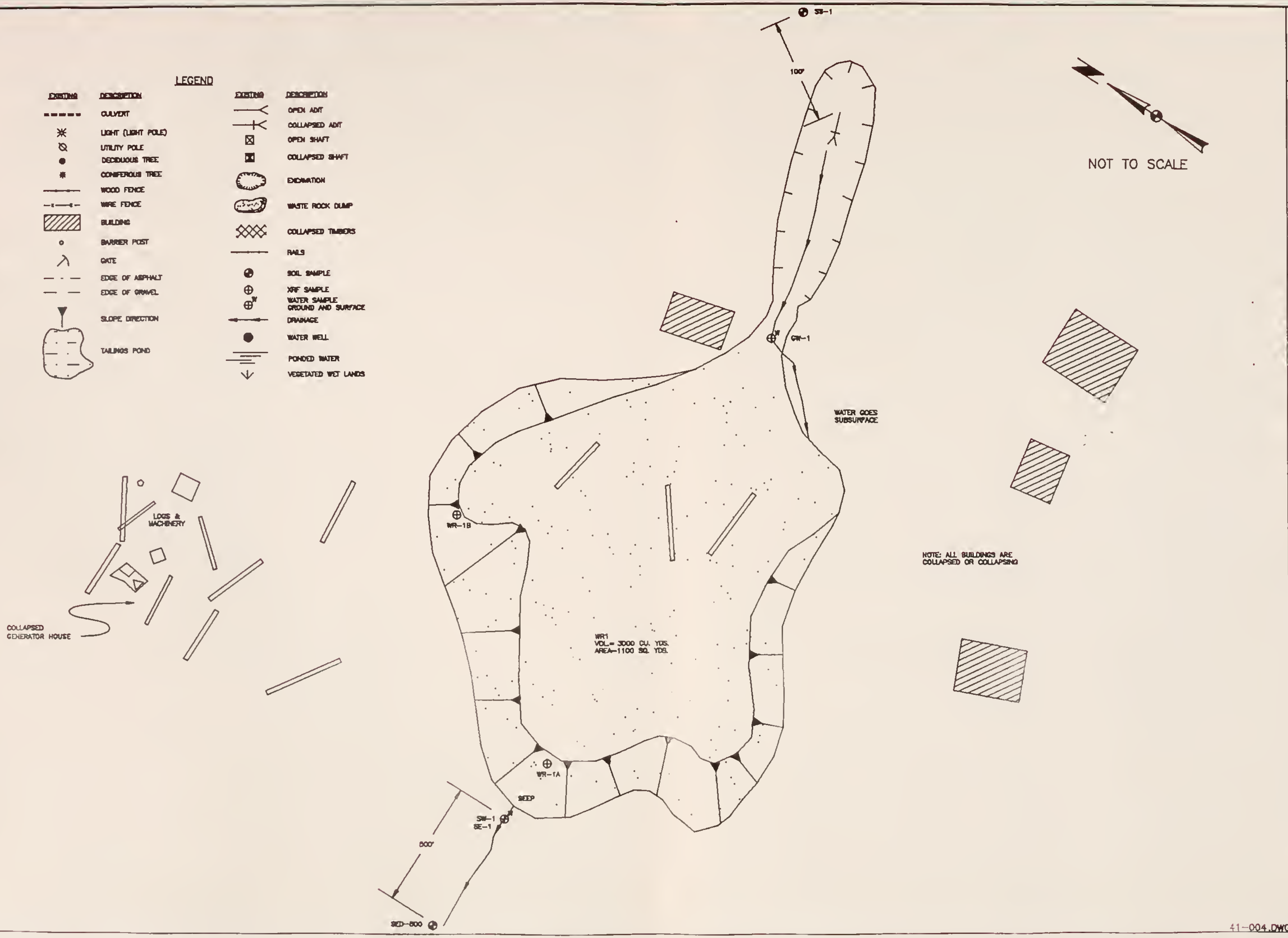
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

MONTANA PRINCE, P.A. NO. 41-004
T03N, R17W, SECTION 14
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

DRAWN JTP DATE 29 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

MONTANA PRINCE PA# 41-004
FROG POND DISTRICT RAVALLI COUNTY

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

41-004.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE SIZE/ VOLUME	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)'	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	3,000	Southwest side of dump near top	None	7.0 (D)	0.05	41-004-WR-1	06/22/93 2112	T-Metals, ABA
WR-1B	WR		North side of dump near top	None	6.8 (D)	0.05			
SS-1	BKGRND	N/A	Background soil approx. 100' northeast of Adit #1	N/A	N/A	N/A	41-004-SS-1	06/22/93 1540	T-Metals

' D-Direct reading(Kelwey Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 41-004-WR-1 is composite of WR-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes X , No___, Number: 1 Identification: Toe of WR-1

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 1

Distance to nearest well used for drinking? Approximately 4 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Very low metal values in dump, which water from adit flows under. Groundwater in contact with possible metal bearing rocks in adit.

Other observations/notes: Water flows from adit and disappears after approximately 25 feet; water appears at base of WR-1 on north side as seep.

GROUNDWATER INVENTORY FORM

SAMPLERS: Flammang, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Water seeping out of collapsed adit	1 gpm (E)	7.54	120	448.1	5.3	49.9	N/A	41-004-GW-1	06/22/93 1400	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Unnamed tributary to Cuba Creek flows past site to south. Water emerges from Adit #1, disappears under WR-1, and reappears at toe to flow down small drainage to meet unnamed tributary 500' below.

Dry streambeds: Yes ____, No X , Name(s): ______

Other surface water: Yes ____, No X , Name(s)/Description: ______

Waste materials within any floodplain: Yes ____, No X Source ID(s): ______

Approximate Flood frequency? ___ 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow: ______, Average Flow: ______

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; water flows under WR-1 and emerges from toe.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Water drains from Adit #1, flows approx. 25', disappears beneath WR-1 and reemerges at toe.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agriculture, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes ____, No X , Distance downstream (ft)? ______ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Flammang, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	10′ below toe of WR-1	7.42	150	385.9	6.4	NM	3 gpm (E)	41-004-SW-1	06/22/93 1515	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	10′ below toe of WR-1	N/A	N/A	N/A	N/A	N/A	N/A	41-004-SE-1	06/22/93 1515	T-Metals
SE-500	SE	500′ below WR-1 before confluence with unnamed tributary	N/A	N/A	N/A	6.4	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approximately 1/2 acre on top of dump and at base of dump.

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments Recreational cabins

Nearest residence(ft or miles)? 1/4 mile to nearest cabin

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Partial	9,900	4,950	No	None
Adit #1	None	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: ____

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None; recreational cabins

Evidence of recreational use on site: Yes___, No_X_, Describe:______

Accessibility - Fences, warning signs, closed roads? Site can only be reached by foot on a small trail that starts on ridge from house approx. 1/4 mile away.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes___, No_X_, Comment______

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _2_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:______

Hazardous structures: Yes_X_, No___, Number_3_, types and locations: Two partially collapsed cabins, south of WR-1; one partially collapsed mine shed, north of Adit #1.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

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MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Montana Prince, Prepared by Northern Engineering and Testing, August 29, 1988.

USBM, Summary Report Mineral Investigation of the Sapphires Rare II Area (No. 1421), Granite and Ravalli Counties, Montana, MLA 74-83, Written by D'Arcy Banister, Terry J. Close, Robin B. McCulloch, Ronald T. Mayerle, and Sally Shoop, 1983, pp. 14-18.

USGS, Topographic Map, Whetstone Ridge, Montana, 7 1/ 2 minute Quadrangle, 1974.

LABORATORY ANALYTICAL DATA

MONTANA PRINCE
PA NO. 41-004

Montana Prince PA# 41−004
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 06/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
41−004−SE−1	6 J	65.1	5.7	4.4	2.3	16.7	4380	0.726 JX	829	6	19	3 UJ	278	NR
41−004−WR−1	7 J	146	5.7	9.3	5.5	41.6	20900	0.829 JX	1220	12	267	4 UJ	292	NR
BACKGROUND	11 J	267	1.7	11	8.7	7.8	12800	0.08 JX	250	9	15	5 UJ	62	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
41−004−WR−1	1.24	38.7	46.7	7.92	0.27	0.41	0.56	12.8	33.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
41−004−GW−1	0.98 U	22.3	2.57 U	9.7 U	6.83 U	1.97	25.5	0.038 U	4.5	12.7 U	0.38 U	30.7 U	7.57 U	44.4
41−004−SW−1	0.98 U	18	2.57 U	9.7 U	6.83 U	2.03	43.3	0.038 U	23.3	12.7 U	0.38 U	30.7 U	13.2	44.8

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
41−004−GW−1	88	< 5.0	5	< 0.05	NR
41−004−SW−1	82	< 5.0	6	< 0.05	NR

LEGEND

SE1 − 10 feet below toe of waste rock dump 1.
WR1 − Composite of subsamples WR1A and 1B.
BACKGROUND − From the Montana Prince (41−004−SS−1).
GW1 − Water seeping from collapsed adit.
SW1 − Same as sample SE1.

XRF ANALYSIS RESULTS

MONTANA PRINCE
PA NO. 41-004

Mine Name: Montana Prince PA# 41-004
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
41-004-SE-500		2270.51	8384.26	583.202	162.277 *	347.333 *	7419.28	246.001 *		45.6549 *		228.424
41-004-SS-1		10833.4	9366.54	1794.12			13553.5		48.0466 *	86.1206 *		248.167
41-004-WR1-A		26181.6	13819.5	1229.09		835.432 *	17483.4		90.151 *	325.18		84.0331
41-004-WR1-B		17458	18255.2	1641.41	107.917 *		16660		44.9391 *	59.0527 *		299.219
41-004-WR-1-COMP		13946.1	16065	1088.3			17526.6		48.0668 *	165.992		204.274

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
41-004-SE-500	52.2473				47.8791			342.48			10.3095 *
41-004-SS-1	103.984		6.0367 *		41.8713			334.816			
41-004-WR1-A	108.104		9.04504 *	219.078	145.994			292.859		14.3994 *	7.97025 *
41-004-WR1-B	123.432			86.7353				505.387			8.52657 *
41-004-WR-1-COMP	98.9357		5.69288 *	99.6671	124.084			435.31			9.45899 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MONTANA PRINCE
PA NO. 41-004

AIMSS SCORESHEET

SITE NAME: MONTANA PRINCE
PA NUMBER: 41-004

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.880
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		1
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	1.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	352
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.985
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		10
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	8668
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		1
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.003
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		5
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	16
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.003
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	5
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.09**

LINE NO.		SITE SAFETY		SITE NAME: MONTANA PRINCE PA NUMBER: 41-004
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	120
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	120
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**3.00**

41-004, #1: SW-1 and SE-1 sample locations toe of WR-1

41-004, #2: Adit #1 (collapsed); GW-1 sample location

41-004, #3: Aerial view of Montana Prince site, facing east

HUGHES CREEK

PLEASANT VIEW

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LUCKY JOE PA#: 41-027

Date: June 22, 1993 Time: 0900

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: Earl McCurley, MDSL
Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Partly cloudy; cool (35°F); scattered showers.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #11: Highwall and Adit #1 (left); #12: WR-1. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Small site

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close openings, grade and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LUCKY JOE PA#: 41-027

Legal Description: T 3S ;R 22W ;Sec. 9 , NW1/4NE 1/4 1/4

County: RAVALLI Mining District: HUGHES CREEK

Latitude: N 45° 35' 33" Longitude: W 114° 19' 00"

Primary Drainage Basin and Code: West Fork Bitterroot/17010205
Secondary Drainage Basin: West Fork Bitterroot

USGS Quadrangle map name(s): Alta

Mine Type/Commodities: Hardrock/Uranium

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Britt Litchford, 666 UPAS #1702, San Diego, CA 92103; Paradise Valley Ranch, P.O. Box 163, Corvallis, MT 59828; Robert Stauter, 2165 Pueblo Circle, Las Vegas, NV 89109; Ellie Cox, c/o Britt Litchford, Nez Perce Road, Darby, MT 59829; Bitterroot National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5330', Slope 25°, Aspect Southern

Land use: Mining___, Recreational X , Residential X , Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 0.25 acres.
Dimensions: 200 feet x 100 feet

Predominant vegetation types: Douglas fir, grasses

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).
Narrow; locked gate at bottom of hill

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on knob on south side of perennial West Fork Bitterroot River which is flowing north past the site. The site is underlain by quartzite following a phyllite vein.

Mining/milling history, ore type/tenor, host rock, gangue: It was discovered in 1956 and some mining occurred in 1957. A 46 lb. grab sample was shipped in 1957 and a 100 ton sample was shipped in 1958. Grade shipped in 1957 was 3.5% uranium oxide. Ore minerals were uraninite, gummite, and uranophane mineralization was spotty so hand sorting was utilized; mineralization occurred in the phyllite vein which cut quartzite.

Mine Operation?

Shafts - Yes___, No X, # ____, Comment
Adits - Yes X, No___, # 2, Comment Both partially open; #2 is 1'x6', #1 is 3'x4'
Pits - Yes___, No X, # ____, Comment
Placers - Yes___, No X, # ____, Comment
Other - Yes___, No X, # ____, Comment

Mill Operation? Yes____, No X. If yes answer the next three questions:

Period(s) of Operation: Mine 1957, sorting and grading only

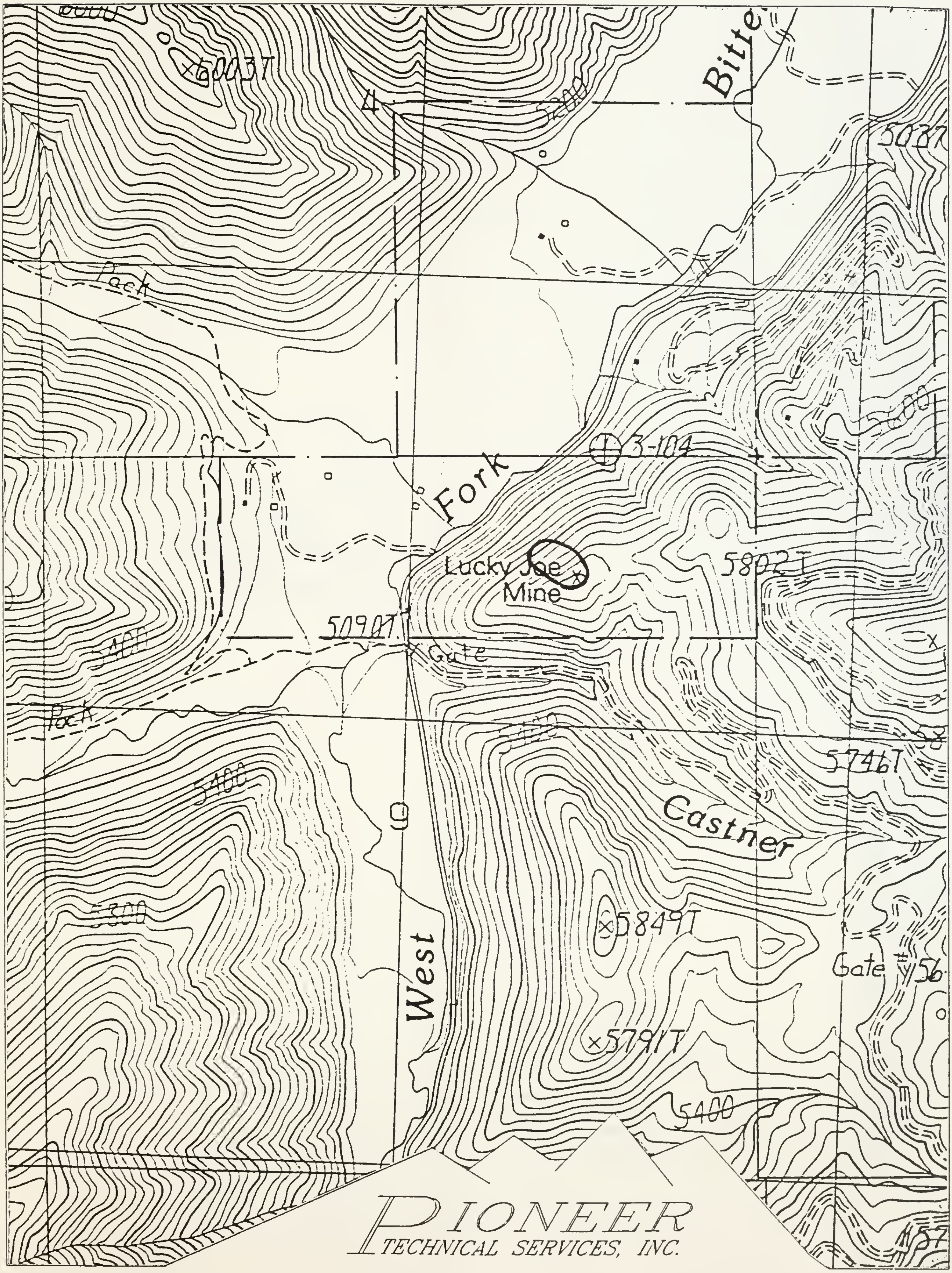
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

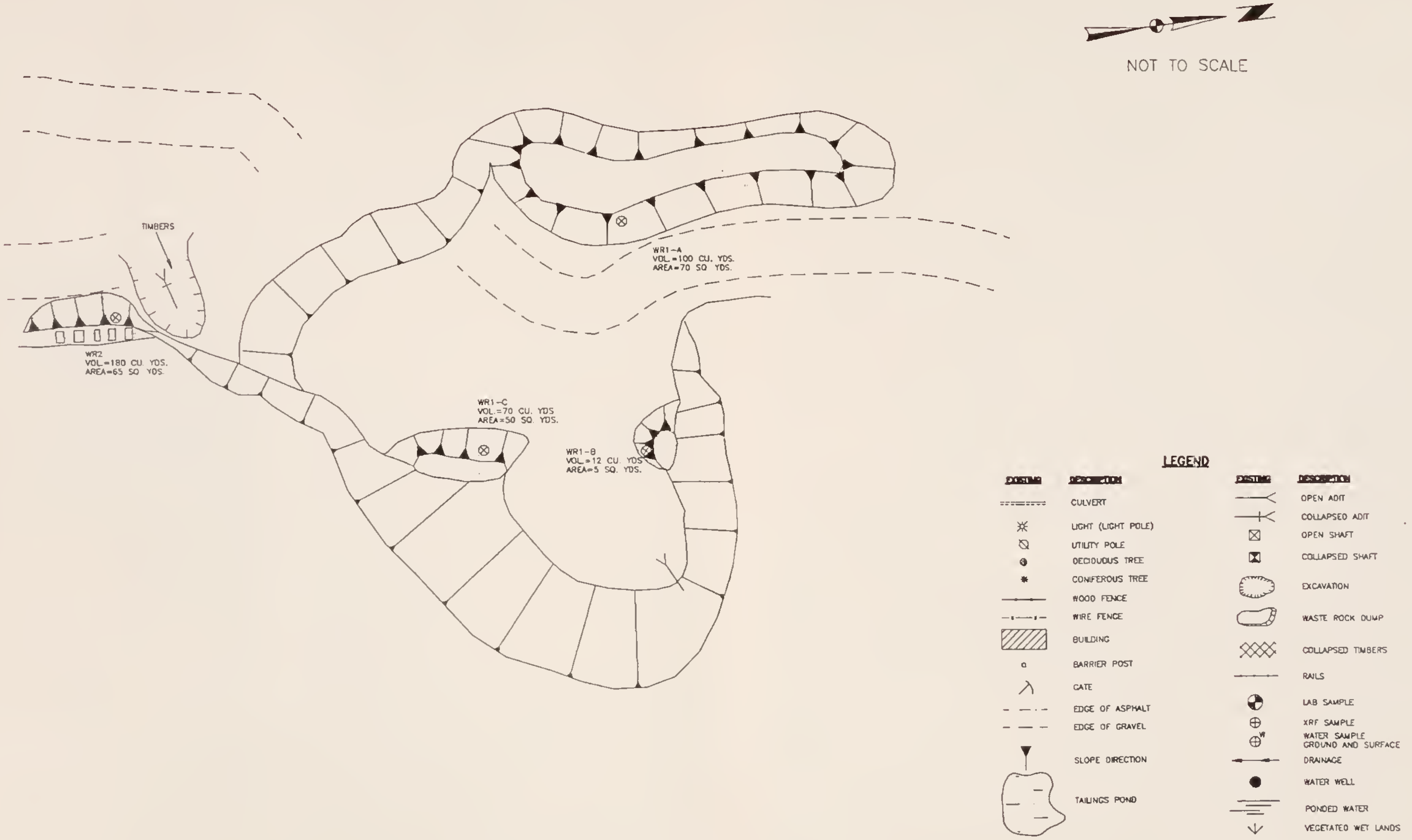
Well No.	Location	Depth	Yield	Static Water Level
M:87258	03S 22W 03 CABD	48.0	15.0	30.00
M:107707	03S 22W 03 CB	38.0	30.0	8.00
M:121429	03S 22W 04 D	38.0	30.0	2.00



PIONEER
TECHNICAL SERVICES, INC.

LUCKY JOE, P.A. NO. 41-027

T03S, R22W, SECTION 09
SCALE: 1" = 1000'



DRAWN JTP DATE 29 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LUCKY JOE PA# 41-027
HUGHES CREEK DISTRICT RAVALLI COUNTY

SHEET NO. 1

1 SHEETS

41-027 DWG

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	100	Dump on west side of site across road from Adit #1	None	6.8 (D)	0.04	41-027-WR-1	06/22/93 2120	T-Metals, ABA
WR-1B	WR	12	Dump adjacent to north of Adit #1	None	6.9 (D)	0.06			
WR-1C	WR	70	Dump south of Adit #1 across talus slope	None	6.8 (D)	0.04			
WR-2	WR	180	Small dump west of Adit #2	None	6.8 (D)	0.04			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 41-027-WR-1 is composite of all waste rock samples.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 15

Distance to nearest well used for drinking? 1/2 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X__.
Very little water at or near site and workings appear to be shallow; lies above West Fork Bitterroot River floodplain, any groundwater going through site would enter that system.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s): West Fork of Bitterroot is in valley bottom below

Dry streambeds: Yes____, No X , Name(s):____

Other surface water: Yes____, No X , Name(s)/Description:____

Waste materials within any floodplain: Yes____, No X Source ID(s):____

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:____, Average Flow:____

Distance between waste source(s) and nearest surface water body (ft)? 600+ feet

Surface water draining onto or through waste sources: Yes____, No X , Describe:____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetlands, irrigation, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?____ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):____

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes ___, No X , Describe:

Carbonate rocks/soils: Yes ___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 ___; 30-100 X ; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments

Nearest residence(ft or miles)? Approx. 1/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang

SOURCE I.D. NO.	**ACID MINE DRAINAGE CHARACTERISTICS** (LIST)	**MOISTURE CONTENT** (WET/DRY/PARTIAL)	**SURFACE AREA** (SQUARE FEET)	**UNCOVERED/UNVEGETATED AREA** (SQUARE FEET)	**AVAILABLE FINES** (YES/NO)	**DUST PROPAGATION POTENTIAL** (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	1,125	1,125	No	None
WR-2	None	Dry	585	585	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_Beer cans_

Accessibility - Fences, warning signs, closed roads?_Gate at road; no signs_

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes_X_, No___, Comment_Adits open_

Primary Drainage___; Secondary Drainage___; No Information_X_:

Riparian Habitat Quality - High___, Medium___, Low___
Wetlands Frontage - High___, Medium___, Low___
Fisheries Habitat and Species Classification - ___
Sport Fishery Classification - ___

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:_One easily accessible (Adit #1); Adit #2 has small opening under timbers._

Hazardous structures: Yes___, No_X_, Number____, types and locations:________________

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_, types and locations:_Highwall present above and to the east of Adit #1 and is approx. 75 feet high._

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________

Bibliography

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Lucky Joe, Prepared by Chen-Northern, June 24, 1989.

USGS, Topographic Map, Alta, Montana, 7 1/2 minute Quadrangle, 1991.

Wallace Miner (Snowshone County, Idaho), Lucky Joe Nears Production Stage, August 22, 1957.

LABORATORY ANALYTICAL DATA

LUCKY JOE
PA NO. 41-027

Lucky Joe PA# 41-027
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 06/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
41-027-WR-1	4 U	30.8	0.6	7.9	60.2	5.2 J	12600	0.02	135	30 J	5 J	4 U	13	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
41-027-WR-1	<0.01	0	24.7	24.7	<0.01	<0.01	<0.01	0	24.7

LEGEND

WR1 - Composite of subsamples WR1A, 1B, 1C, and 2A.
BACKGROUND - From the Mill Creek (32-049-SS-1).

XRF ANALYSIS RESULTS

LUCKY JOE
PA NO. 41-027

Mine Name: Lucky Joe PA# 41-027
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
41-027-WR1-A		21949.7	5788.1	2191.82			17529.5		62.4554 *	66.6106 *		40.69
41-027-WR1-B		25353.8	9907.3	2228.26			18602.4					67.8722
41-027-WR1-C		24749.5	4715.65	2230.01			18381.9					54.2027
41-027-WR-1-COMP		22173.8	6137.31	2514.32			22321.8			48.8745 *		61.7654
41-027-WR-2		27351.5	6018.37	2946.64			21575.2	297.284 *		63.4006 *		60.0924

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
41-027-WR1-A	115.205				125.222			133.55			
41-027-WR1-B	118.425		4.15336 *	16.6523 *	161.185			128.322			
41-027-WR1-C	128.212	64.7945 *			148.316			147.772		12.7621 *	6.58226 *
41-027-WR-1-COMP	119.853				172.894			154.674	237.31 *		
41-027-WR-2	116.069		4.87569 *		169.587			164.751			

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LUCKY JOE
PA NO. 41-027

AIMSS SCORESHEET

SITE NAME: LUCKY JOE
PA NUMBER: 41-027

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.022
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		12
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	24.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	108

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.023
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	16

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0

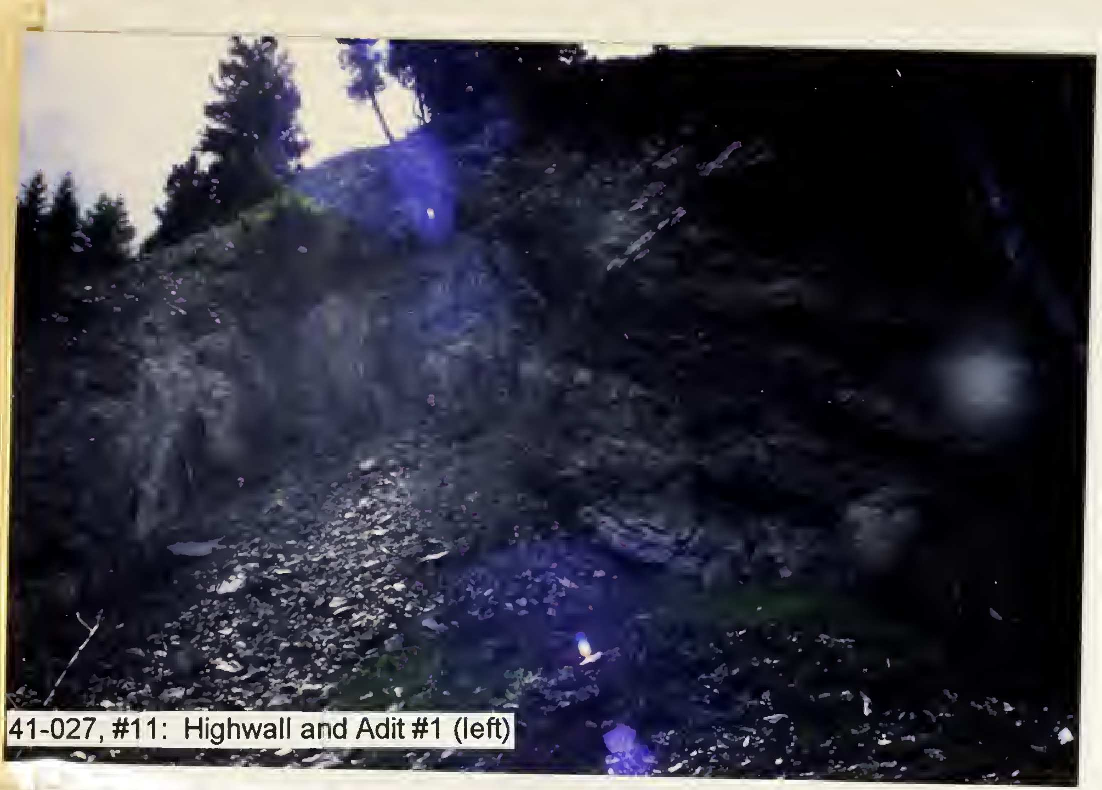
DIRECT CONTACT PATHWAY

LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	17
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	3

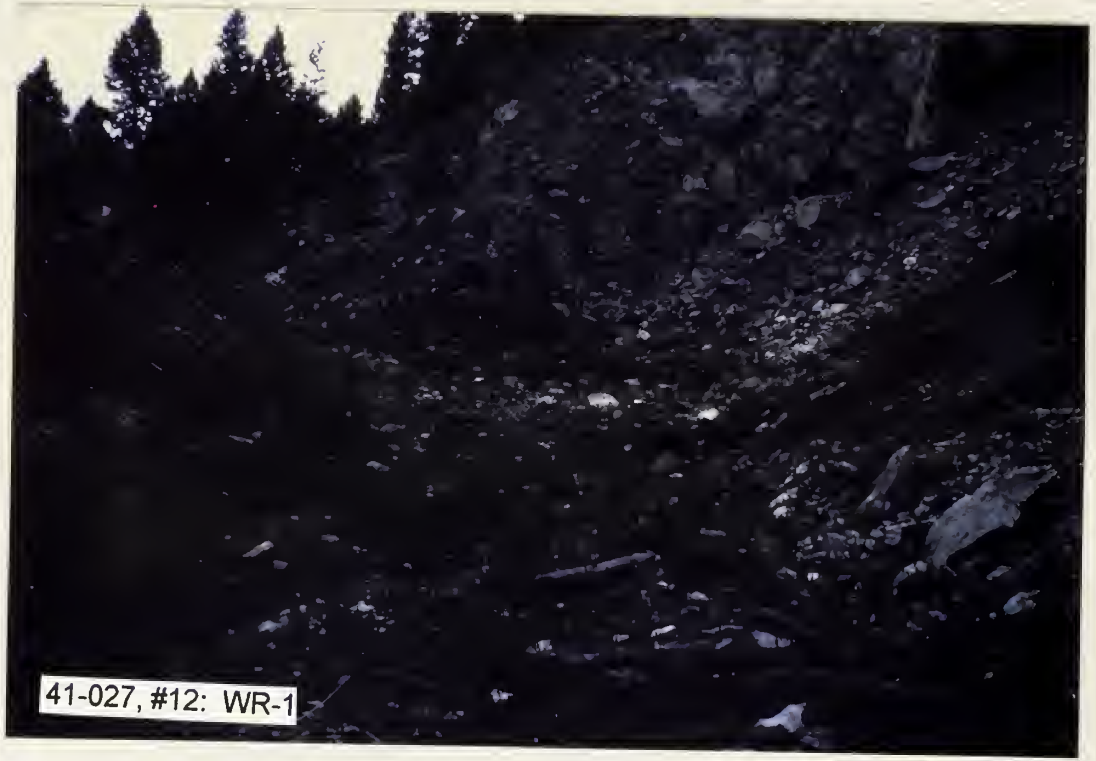
LINE NO.		
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.00**

SITE NAME: LUCKY JOE
PA NUMBER: 41-027

LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	175
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	17
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**29.75**



41-027, #11: Highwall and Adit #1 (left)



41-027, #12: WR-1

PLEASANT VIEW

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BLUEBIRD PA#: 41-009

Date: September 8, 1993 Time: 1445-1830

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Warm; calm; clear; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #14: Shaft at WR-4; #15: Adit at WR-1/barrow pit area; #16: Barrow pit area; #17: WR-3; #18: Adit at WR-3; #19: WR-1A; #20: Shaft at WR-2.
Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Dump material has been used as borrow for road building.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close shafts

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BLUEBIRD PA#: 41-009

Legal Description: T 7N ;R 21W ;Sec. 4 , NE1/4 SW1/4 ___ 1/4

County: RAVALLI Mining District: PLEASANT VIEW

Latitude: N 46° 23' 24" Longitude: W 114° 13' 53"

Primary Drainage Basin and Code: Bitterroot River/17010205
Secondary Drainage Basin: Bear Creek

USGS Quadrangle map name(s): Victor

Mine Type/Commodities: Hardrock/Silver, Copper

Activity Status: Active ___,Inactive/Exploration ___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Dick Anderson, 1916 Brooks, Suite 105, Missoula, MT 59801.

Relationship to other mines/sites in the area/district: In close proximity to the Pleasant View Mine.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 4220', Slope 0°-15°,
Aspect Southwest

Land use: Mining ___, Recreational X , Residential ___, Urban ___,
Agricultural ___, Other(Specify) ___

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions: ___

Predominant vegetation types: Ponderosa pine, Douglas fir, Engleman spruce, larch

Access: roads - good X ,poor ___,4wd ___,trail ___.
Other logistical considerations (proximity to other sites). ___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 115 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on north side of Bear Creek on an intermittent tributary to the creek. Water leaving the site would flow south to Bear Creek and then southeast and east to confluence with Bitterroot River, south of Victor approx. 5 miles away.

Mining/milling history, ore type/tenor, host rock, gangue: The Blue Bird property is adjacent to the Pleasant View Mine, which was initially discovered in 1871 with limited production thereafter. The dump material at the Blue Bird is principally vein material composed of white quartz with pyrite. Wall rock was apparently a white granite.

Mine Operation?
Shafts - Yes X, No ___, # 3, Comment 1 caved; 1 filled with garbage; 1 20' deep
Adits - Yes X, No ___, # 2, Comment Both caved
Pits - Yes X, No ___, # Many, Comment Small exploration pits
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes X, No ___, # ___, Comment Road material borrow area

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Water Well Log Data

Well No.	Location	Depth	Yield	Static Water Level
M:56733	07N 21W 03	218.0	1.0	130.00
M:56732	07N 21W 03	201.0	3.0	78.00
M:56728	07N 21W 03	20.0	100.0	0.00
M:56730	07N 21W 03	114.0	2.0	25.00
M:56734	07N 21W 03	100.0	2.0	39.00
M:56731	07N 21W 03	109.0	0.0	109.00
M:56727	07N 21W 03	105.0	2.0	55.00
M:56735	07N 21W 03 AA	70.0	15.0	28.00
M:56736	07N 21W 03 AC	80.0	10.0	39.00
M:56753	07N 21W 03 AC	80.0	10.0	55.00
M:124461	07N 21W 03 ADB	100.0	8.0	23.00
M:56737	07N 21W 03 BC	23.0	20.0	2.00
M:56729	07N 21W 03 CB	158.0	10.0	38.00
M:56738	07N 21W 03 CB	16.0	250.0	0.00
M:56739	07N 21W 03 CBA	189.0	15.0	31.00
M:56740	07N 21W 03 CBC	60.0	10.0	4.00
M:56741	07N 21W 03 CC	148.0	7.0	35.00
M:56742	07N 21W 03 CCB	160.0	10.0	40.00
M:56743	07N 21W 03 CCD	130.0	3.0	50.00
M:56744	07N 21W 03 CD	300.0	3.0	40.00
M:56745	07N 21W 03 DA	112.0	100.0	50.00
M:56746	07N 21W 03 DB	56.0	8.0	31.00
M:56747	07N 21W 03 DD	40.0	25.0	20.00
M:56748	07N 21W 03 DD	105.0	10.0	40.00
M:56749	07N 21W 03 DDD	34.0	20.0	11.00
[illegible]56752	07N 21W 04	60.0	0.0	26.00
M:56750	07N 21W 04	160.0	7.0	25.00
M:56751	07N 21W 04	180.0	2.0	5.00
M:56754	07N 21W 04 AA	80.0	10.0	30.00
M:56755	07N 21W 04 ABC	460.0	1.0	8.00
M:56756	07N 21W 04 ABC	220.0	3.0	30.00
M:56757	07N 21W 04 BB	113.0	7.0	80.00
M:124462	07N 21W 04 CCA	35.0	5.0	6.00
M:123094	07N 21W 08 AD	110.0	50.0	10.00
M:123089	07N 21W 08 AD	71.0	25.0	10.00
M:122160	07N 21W 08 AD	109.0	15.0	18.00
M:56771	07N 21W 09	250.0	3.0	Flowing
M:56767	07N 21W 09	225.0	2.0	54.00
M:56763	07N 21W 09	120.0	10.0	85.00
M:56765	07N 21W 09	73.0	8.0	42.00
M:56770	07N 21W 09	37.0	15.0	20.00
M:56769	07N 21W 09	106.0	10.0	35.00
M:56768	07N 21W 09	45.0	25.0	28.00
M:56764	07N 21W 09	193.0	5.0	45.00
M:56766	07N 21W 09	200.0	5.0	51.00
M:56772	07N 21W 09 A	69.0	4.0	35.00
M:56773	07N 21W 09 A	59.0	1.0	12.00
M:121457	07N 21W 09 AA	560.0	2.0	123.00
M:56774	07N 21W 09 ACA	230.0	10.0	35.00
M:[illegible]0842	07N 21W 09 BD	52.0	40.0	22.00
[illegible]3102	07N 21W 09 BD	59.0	10.0	38.00
M:123105	07N 21W 09 CC	38.0	50.0	18.00
M:56775	07N 21W 10	200.0	6.0	55.00
M:56779	07N 21W 10	228.0	10.0	20.00
M:56782	07N 21W 10	29.0	10.0	3.00

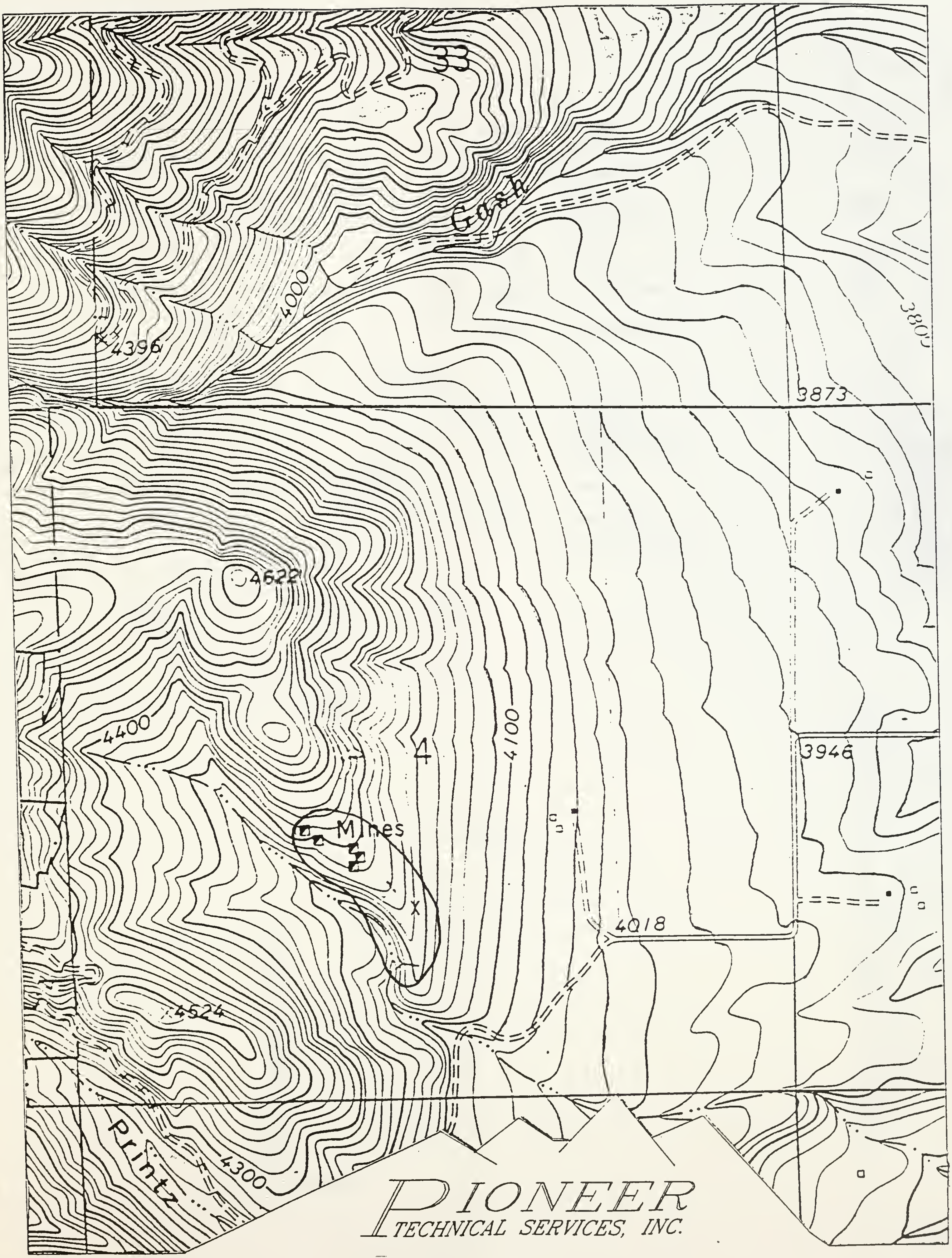
M:56776	07N 21W 10	28.0	20.0	3.00
M:56783	07N 21W 10	38.0	3.0	7.00
M:56778	07N 21W 10	71.0	20.0	42.00

Montana Bureau of Mines and Geology
Water Well Log Data

11/15/1993

Well No.	Location	Depth	Yield	Static Water Level
M:56781	07N 21W 10	572.0	0.0	572.00
M:56777	07N 21W 10	28.0	20.0	3.00
M:56785	07N 21W 10	58.0	15.0	37.00
M:56784	07N 21W 10	38.0	40.0	7.00
M:56780	07N 21W 10	240.0	1.0	30.00
M:56788	07N 21W 10 AA	38.0	40.0	19.00
M:56786	07N 21W 10 AA	26.0	10.0	8.00
M:56787	07N 21W 10 AA	36.0	20.0	19.00
M:56789	07N 21W 10 AB	250.0	3.0	80.00
M:56790	07N 21W 10 ABC	40.0	40.0	6.00
M:56791	07N 21W 10 ABD	39.0	50.0	15.00
M:56792	07N 21W 10 ACA	120.0	8.0	8.00
M:56794	07N 21W 10 B	32.0	20.0	10.00
M:56795	07N 21W 10 B	36.0	20.0	17.00
M:56793	07N 21W 10 B	190.0	2.0	50.00
M:56796	07N 21W 10 BA	33.0	10.0	25.00
M:56798	07N 21W 10 BB	49.0	20.0	26.00
M:56800	07N 21W 10 BB	69.0	3.0	15.00
M:123106	07N 21W 10 BB	39.0	20.0	15.00
M:56801	07N 21W 10 BB	50.0	2.0	15.00
M:56799	07N 21W 10 BB	38.0	200.0	8.00
M:56797	07N 21W 10 BB	48.0	0.0	0.00
M:56802	07N 21W 10 BC	40.0	7.0	20.00
M:124463	07N 21W 10 BC	60.0	0.0	60.00
M:56803	07N 21W 10 BD	105.0	7.0	18.00
M:56804	07N 21W 10 BD	100.0	3.0	22.00
M:56805	07N 21W 10 BDB	28.0	6.0	10.00
M:56806	07N 21W 10 CA	37.0	20.0	7.00
M:56807	07N 21W 10 CCB	40.0	15.0	15.00
M:56808	07N 21W 10 CD	50.0	10.0	26.00
M:56809	07N 21W 10 CD	160.0	10.0	40.00
M:56811	07N 21W 10 D	180.0	10.0	70.00
M:56812	07N 21W 10 D	99.0	30.0	52.00
M:56810	07N 21W 10 D	46.0	40.0	27.00
M:56813	07N 21W 10 DA	145.0	9.0	11.00
M:58387	08N 21W 32	216.0	20.0	98.00
M:58388	08N 21W 33	83.0	10.0	40.00
M:58389	08N 21W 33	140.0	0.0	Flowing
M:126860	08N 21W 33 BD	156.5	0.0	0.00
M:121906	08N 21W 33 DD	200.0	0.0	0.00
M:120406	08N 21W 33 DD	40.0	10.0	6.00
M:58393	08N 21W 34	288.0	8.0	5.00
M:58396	08N 21W 34	500.0	10.0	140.00
M:58392	08N 21W 34	160.0	4.0	10.00
M:58394	08N 21W 34	206.0	15.0	23.00
M:58390	08N 21W 34	190.0	1.0	38.00
M:58395	08N 21W 34	340.0	0.0	0.00
M:58391	08N 21W 34	47.0	0.0	0.00
M:128784	08N 21W 34 AA	30.0	15.0	9.00
M [illegible]26203	08N 21W 34 AAC	50.0	10.0	8.00
[illegible]58397	08N 21W 34 BA	220.0	6.0	59.00
M:128787	08N 21W 34 BAA	26.0	8.0	9.00
M:127459	08N 21W 34 BAA	48.0	30.0	17.00
M:58399	08N 21W 34 BAC	40.0	20.0	5.00
M:58398	08N 21W 34 BAC	510.0	4.0	110.00

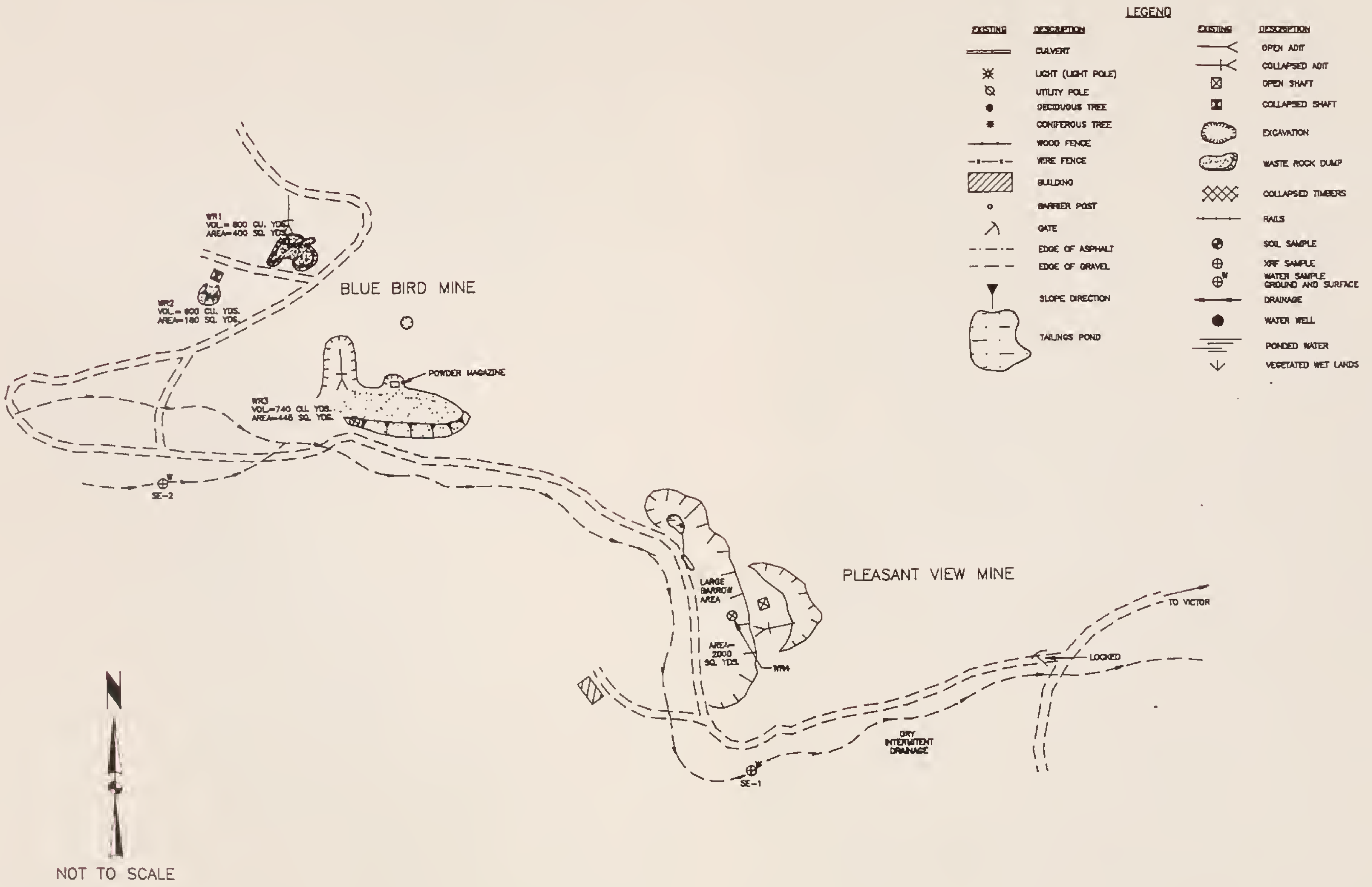
M:58400	08N 21W 34 CDCC	26.0	7.0	16.00
M:58401	08N 21W 34 DCC	520.0	10.0	55.00



BLUEBIRD, P.A. NO. 41-009

T07N, R21W, SECTION 04

SCALE: 1" = 1000'



DRAWN JTP DATE 30 NOV 93
DESIGNED TPR JOB NO. 41-009
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BLUE BIRD PA# 41-009
PLEASANT VIEW DISTRICT RAVALLI COUNTY

SHEET NO.

41-009.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	800	East upper shaft; south of shaft, east side on top	None	7.0 (D)	0.03	41-009-WR-1	09/08/93 2230	T-Metals, ABA
WR-2	WR	600	West upper shaft; south of shaft, south side on top	None	6.2 (D)	0.05			
WR-3	WR	740	Western lower adit; west of adit, southeast corner of dump	None	7.0 (D)	0.04			
WR-4	WR	ND	Eastern lower adit/shaft; southwest of shaft, east side of dump	None	6.9 (D)	0.05			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 41-009-WR-1 is composite of WR-1, WR-2, WR-3, and WR-4.
ND = Not Determined

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X **, No**___**, Number:** 1 **Identification:** One discharge occurs earlier in the year, but not flowing at time of this investigation.

Filled shafts: Yes___**, No** X **, Number:**___ **Identification:**___

Seeps/Springs: Yes X **, No**___**, Number:** 1 **Identification:** Small seep at the north end of WR-4 barrow area

Groundwater wells within 4 miles?: Yes X **, No**___**;**

Number of well logs: 1,106; Well log count includes the town of Victor, while population count does not.

Distance to nearest well used for drinking? 1/4 to 1/2 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___**, Probable**___**, Possible** X **, Unlikely**___**.**

Workings may contact groundwater. Garbage in shaft may also cause isolated contamination.

Other observations/notes: Spring runoff sampling for adit discharges are recommended. During this investigation, there was only damp soil in front of caved portals.

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Unnamed tributary to Bear Creek

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-3

Approximate Flood frequency?___1 yr, X 10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0 during investigation
High Flow: 3-4 cfs , Average Flow: 0

Distance between waste source(s) and nearest surface water body (ft)? 30 feet between WR-3 and intermittent drainage.

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Stock watering, irrigation, fishery, T&E - Bald Eagle

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow' cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	Downgradient sediment sample in intermittent drainage	N/A	N/A	N/A	N/A	N/A	N/A	41-009-SE-1	09/08/93 1515	T-Metals
SE-2	SE	Upgradient sediment sample in intermittent drainage	N/A	N/A	N/A	N/A	N/A	N/A	41-009-SE-2	09/08/93 1545	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 to 20 acres in the vicinity of the mine.

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_____, No_X_, Describe: None observed, although pH of dump rock is high and limestone associated with the Wallace Formation is reported in the vacinity.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000_X_; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1/4 to 1/2 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	3,600	3,240	Yes	Low
WR-2	None	Dry	1,620	1,620	Yes	Low
WR-3	None	Dry	4,000	400	Yes	Low
WR-4	None	Dry	18,250	18,250	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____,
Describe: Loggers temporarily working within 200 feet.

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments______

Evidence of recreational use on site: Yes___, No_X_, Describe:______

Accessibility - Fences, warning signs, closed roads? Gate usually locked below the site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes___, No_X_, Comment______

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_Not Rated
Wetlands Frontage - High___, Medium___, Low_Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:
One upper shaft at WR-2; the lower shaft at WR-4

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_,
types and locations: Highwall at borrow area associated with WR-4 is approx. 40 feet high at the highest point.

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:______

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______

Bibliography

MBMG, Mines and Mineral Deposits, Missoula and Ravalli Counties, Montana, Bulletin 8, Written by Uuno M. Sahinen, January 1957.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Bluebird site, Prepared by Chen-Northern, June 10, 1989.

USGS, Topographic Map, Victor, Montana, 7 1/2 minute Quadrangle, 1967.

LABORATORY ANALYTICAL DATA

BLUE BIRD
PA NO. 41-009

Blue Bird PA# 41-009
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/08/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
41-009-SE-1	14.7 J	138	0.6 U	9.31	7.29	35	24300	0.41 J	1550	5.03	48.5	6.61 UJ	157 J	NR
41-009-SE-2	12.8 J	160	0.6 U	6.1	3.76	20.6	14100	0.034 U	1700	3.6	21.8	7.24 UJ	203 J	NR
41-009-WR-1	7.28 J	24.2	0.6	1.94 U	1.37 U	117	6890	1.43 J	237	2.53 U	64.9	6.13 UJ	102 J	NR
BACKGROUND	5.04 U	357 J	0.6 U	8.34 J	8.69	5.95 J	10700	0.144	2320 J	7.66	18.4	6.56 UJ	58.9	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
41-009-WR-1	0.21	6.56	12.6	6.05	0.1	0.02	0.09	0.62	12

LEGEND

SE1 - Downgradient sediment sample in intermittant drainage.
SE2 - Upgradient sediment sample in intermittant drainage.
WR1 - Composite of subsamples WR2, 3, and 4.
BACKGROUND - From the Mill Creek Mine (32-049-SS-1).

XRF ANALYSIS RESULTS

BLUE BIRD
PA NO. 41-009

Mine Name: Blue Bird PA# 41-009
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
41-009-WR1-A		20065.5	6662.71	275.877 *		307.816 *	4437.27		591.144	325.446		154.126
41-009-WR-2		33811.8	15716.4	1061.67		777.303 *	10870.6			51.1125 *		1453.29
41-009-WR-1-COMP		22225.3	10142.7	953.648		531.603 *	11641.7		145.945 *	144.789		784.695
41-009-WR-3		19490.7	13399.5	1017.45		605.132 *	10062.5			77.2661 *		1136.47
41-009-WR-4		35510.5	5585.29	1519.64		452.598 *	32321.9		126.493 *	102.877 *		960.266

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
41-009-WR1-A	156.803		5.7875 *	88.3999	151.172		53.0185 *	79.0621		23.5682 *	13.8687 *
41-009-WR-2	166.159			36.4996 *	137.029			1974.05			18.1835 *
41-009-WR-1-COMP	162.38			68.1882	129.684			922.076		18.791 *	14.9381 *
41-009-WR-3	170.295			45.8348 *	97.3652			1052.68			15.6179 *
41-009-WR-4	175.741		13.4765 *	208.737	240.742		80.4744 *	1412.59			19.4582 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BLUE BIRD
PA NO. 41-009

AIMSS SCORESHEET

SITE NAME: BROKEN HILL
PA NUMBER: 45-005

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	69.216
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		34
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	36.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1010554

SURFACE WATER PATHWAY

LINE NO.				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	75.907
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	12
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	364354

AIR PATHWAY

LINE NO.				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.748
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	35
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	4809

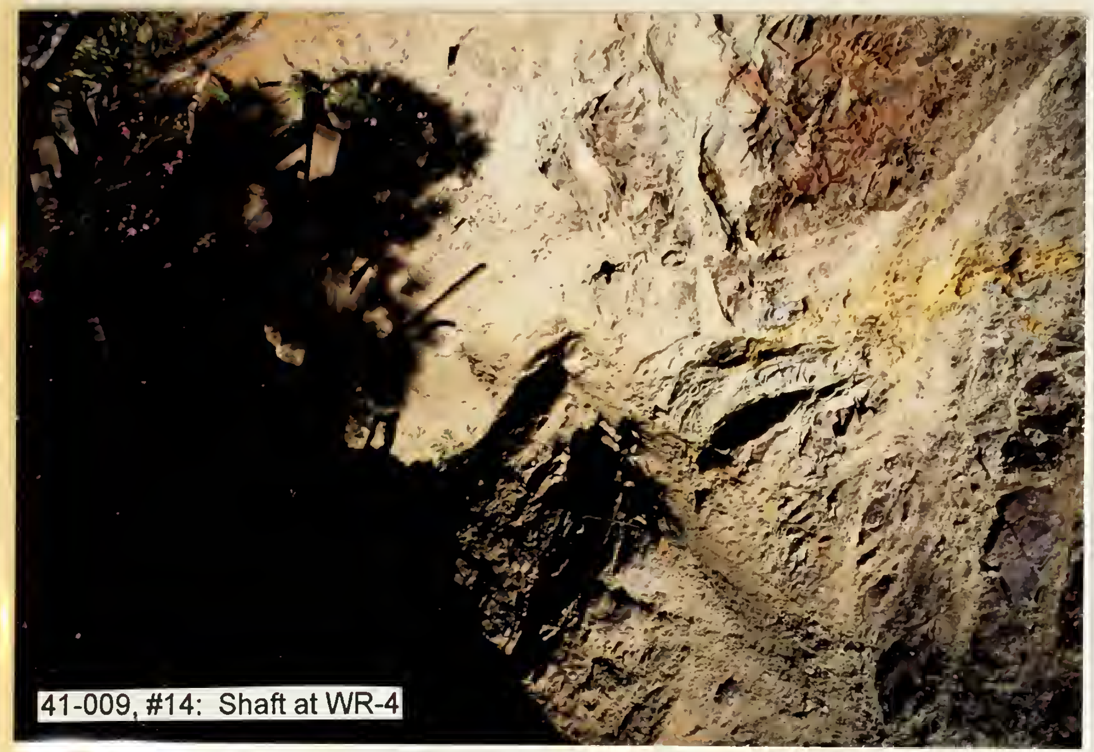
DIRECT CONTACT PATHWAY

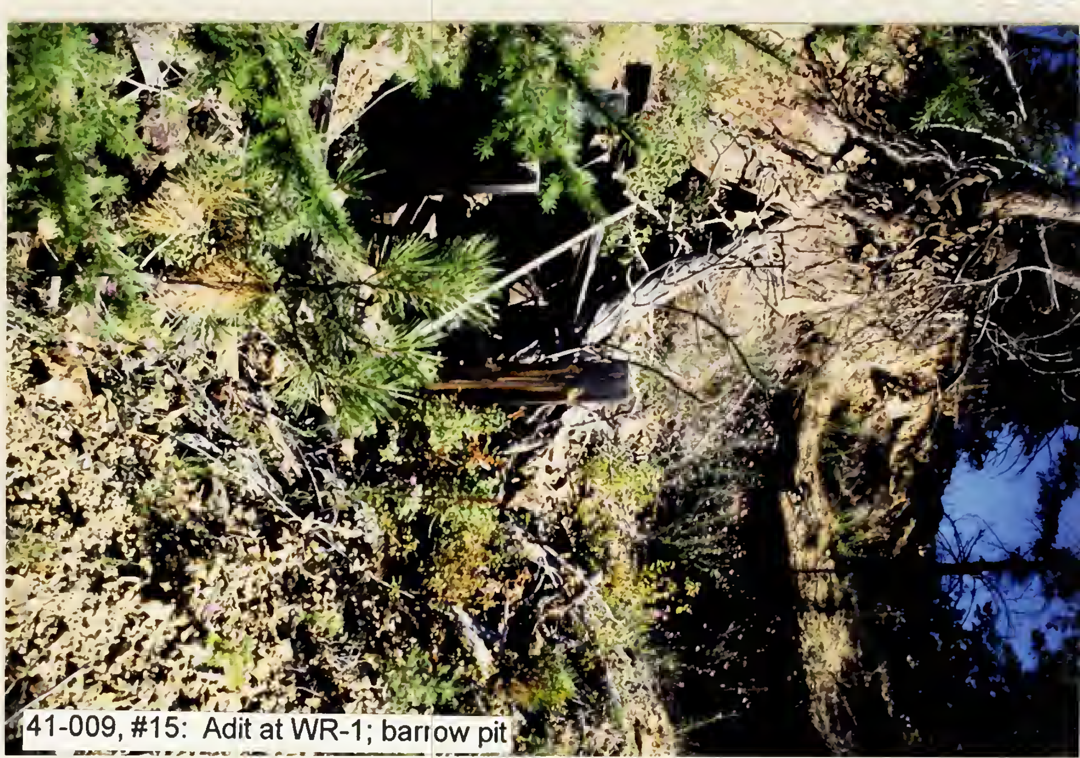
LINE NO.				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.500
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0

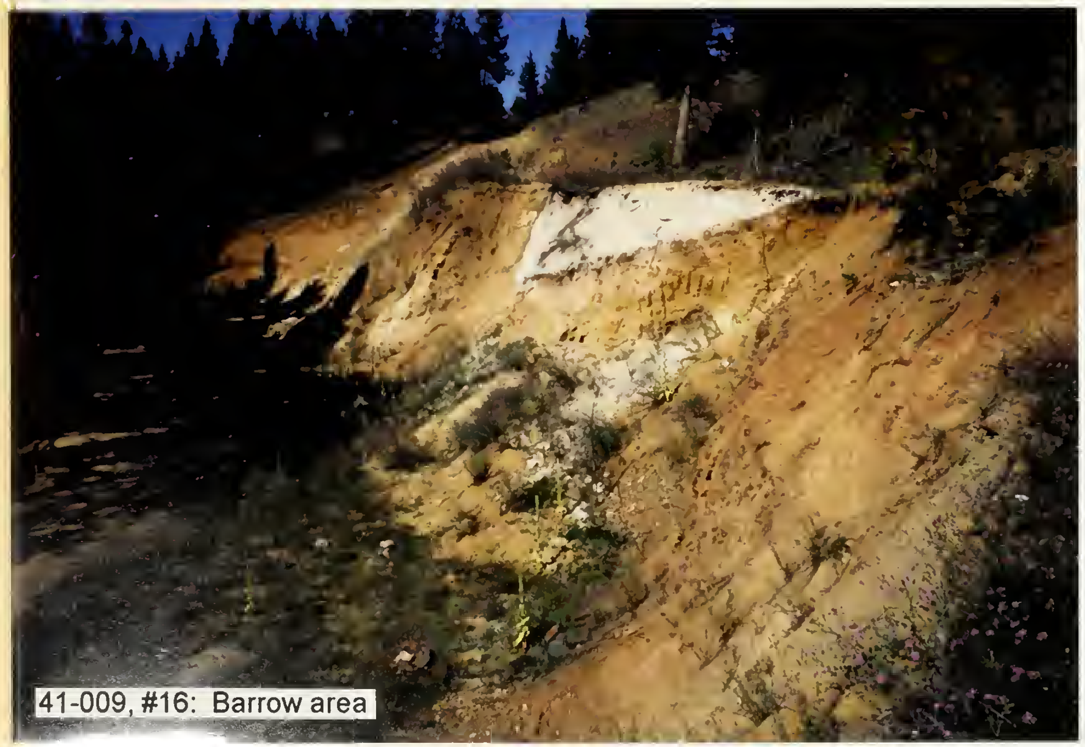
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**13.80**

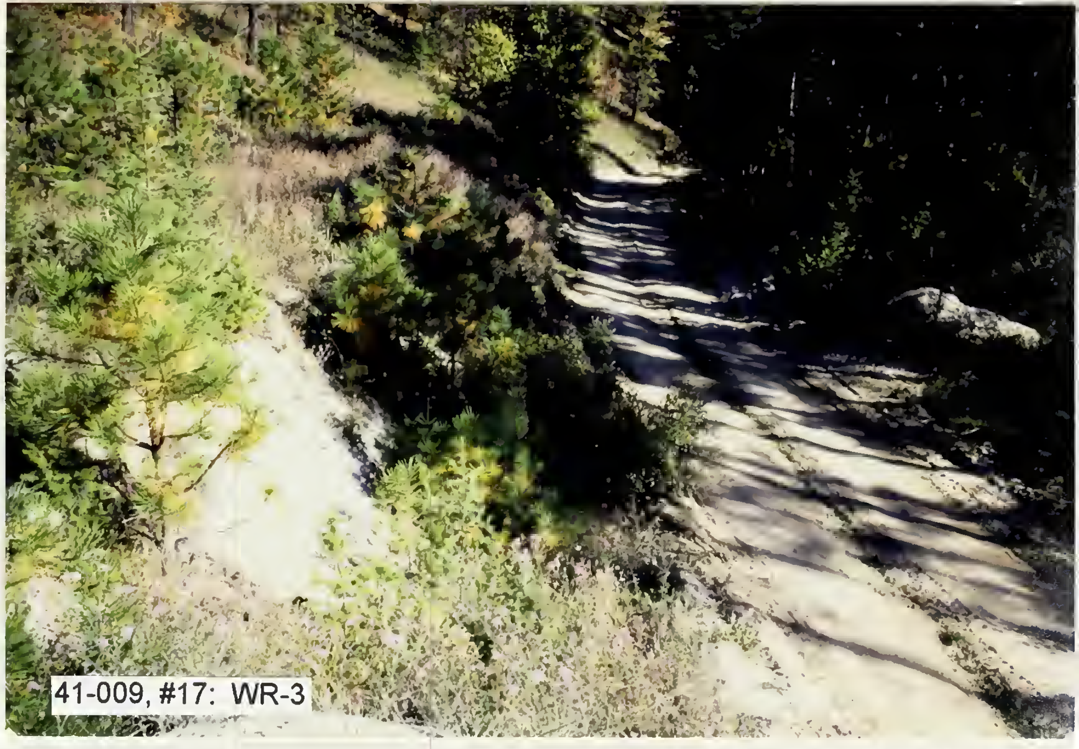
SITE NAME: BROKEN HILL
PA NUMBER: 45-005

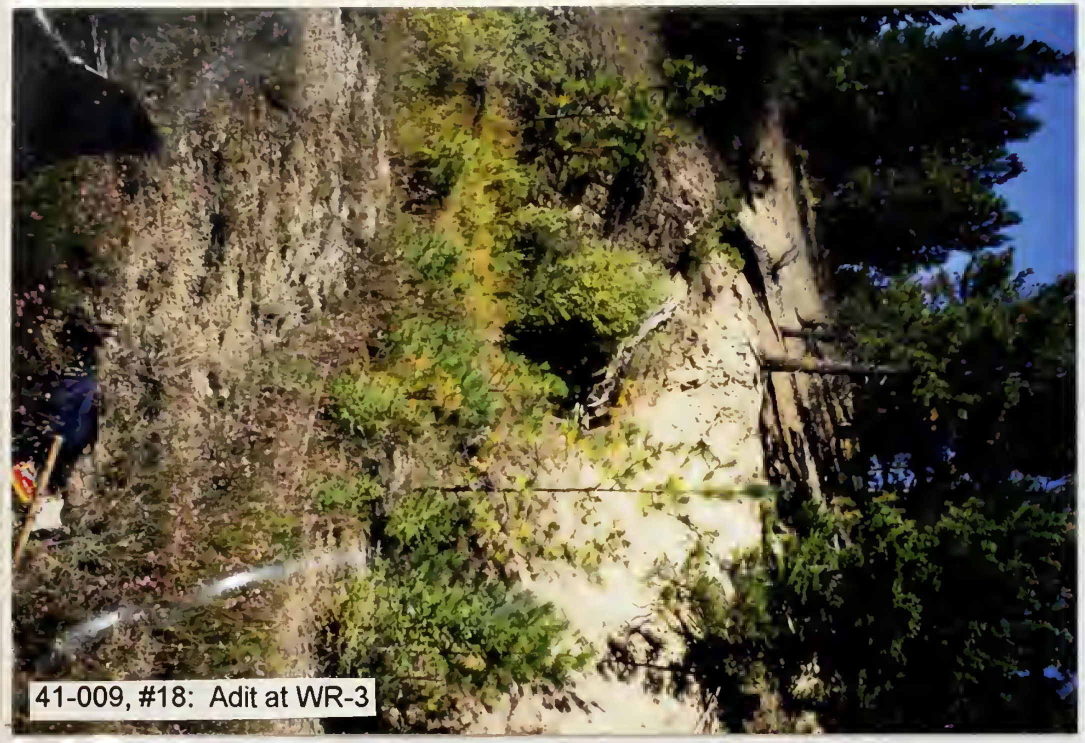
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	175
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**


41-009, #14: Shaft at WR-4

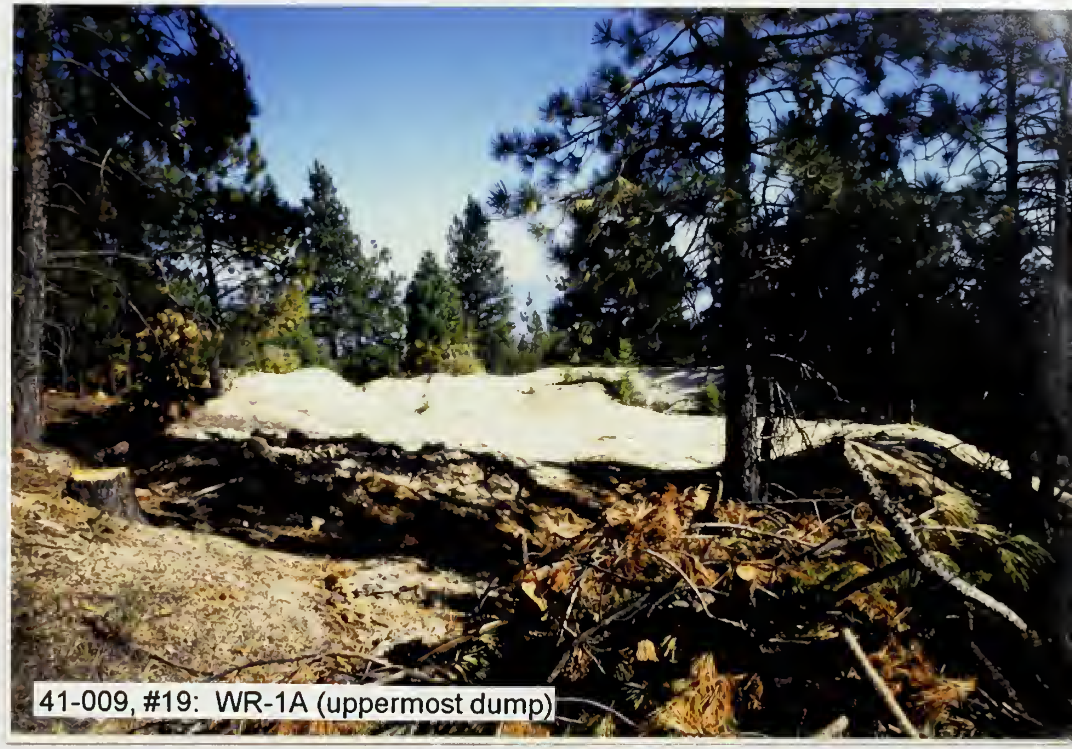

41-009, #15: Adit at WR-1; barrow pit


41-009, #16: Barrow area

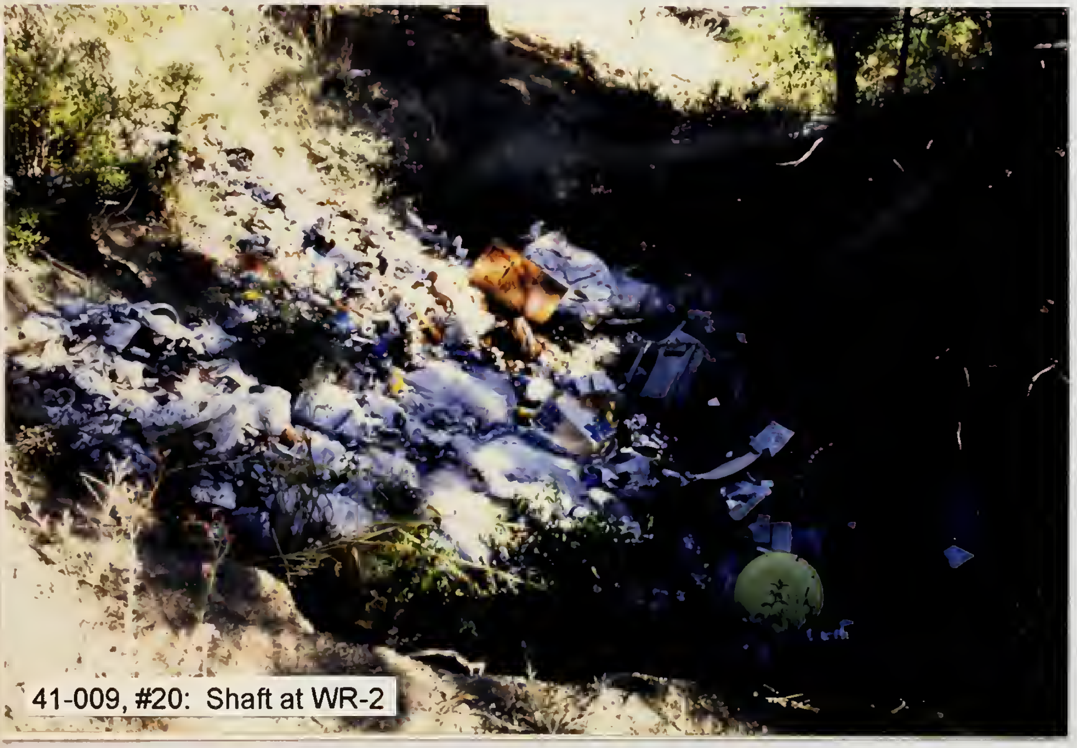

41-009, #17: WR-3



41-009, #18: Adit at WR-3



41-009, #19: WR-1A (uppermost dump)



41-009, #20: Shaft at WR-2

SANDERS

BLUE CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BROKEN HILL PA#: 45-005

Date: August 3, 1993 Time: 1830

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Flammang, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (80°F); sunny; calm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #19: WR-1, adit, and upper workings, facing north; #20: WR-2, facing north; #21: Adit and discharge, GW-1 sample location. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is identified as Brown Hill on topographic map. Splits of lab samples GW-1, WR-1, and WR-2 were sent to owner as per request.

Other Hazardous Materials/Substances Present: Two barrels were present on-site: One steel barrel at adit is empty; and, one plastic barrel near bottom of WR-1 is half-way full of unknown contents.

General Comments on Potential Remedial Alternatives: Grade, amend, and revegetate dump materials. Study adit discharge treatment requirements.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BROKEN HILL PA#: 45-005

Legal Description: T 27N ;R 34W ;Sec. 10 , SW1/4 SW1/4 NE1/4

County: SANDERS Mining District: BLUE CREEK

Latitude: N 48° 07' 15" Longitude: W 115° 58' 06"

Primary Drainage Basin and Code: East Fork Blue Creek/17010213
Secondary Drainage Basin: East Fork Blue Creek

USGS Quadrangle map name(s): Heron

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): William Swan, 57888 Tall Mines Road, Coeur d'Alene, ID 83814. (208) 664-1764; Kootenai National Forest.

Relationship to other mines/sites in the area/district: This site is located 3/4 mile southeast of the Scotchman Mine. Mines in the district are all replacement deposits along or near faults associated with the Hope Fault.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4200', Slope 25°,
Aspect Southwest

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify) Logging

Area of disturbed/unvegetated lands? 1.5 acres.
Dimensions:

Predominant vegetation types: Douglas fir, spruce, cottonwood, Mountain maple, Sitka alder, thimbleberry

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). This site is located 3.5 miles north of U.S. Highway 10-A; locked gate on Forest Service Road 2290.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by Burke quartzite of the Ravalli Formation. Mineralization occurred in shear zones, in small faults along the Hope Fault, a large northwest trending transverse fault that has been traced from Hope, Idaho to Heron, Montana. The site lies approx. 500 feet to the south of an unnamed intermittent drainage to East Fork Blue Creek, a perennial stream. Water from the site would flow north into the creek and then west to junction with East Fork Blue Creek approx. 1 mile away.

Mining/milling history, ore type/tenor, host rock, gangue: First recorded production was in 1925; for the years 1925 to 1927 inclusive, 942 oz. Ag, 53,057 lbs. Pb, and 176,632 lbs. Zn was produced from 273 tons of ore. Both adits caved before 1960. Pyrite, pyrrhotite, sphalerite, galena, chalcopyrite, and arsenopyrite are present in a gangue of quartz, tourmaline, and tremolite.

Mine Operation?
Shafts - Yes X, No ___, # ___, Comment Possible; caved
Adits - Yes X, No ___, # 2, Comment Caved
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

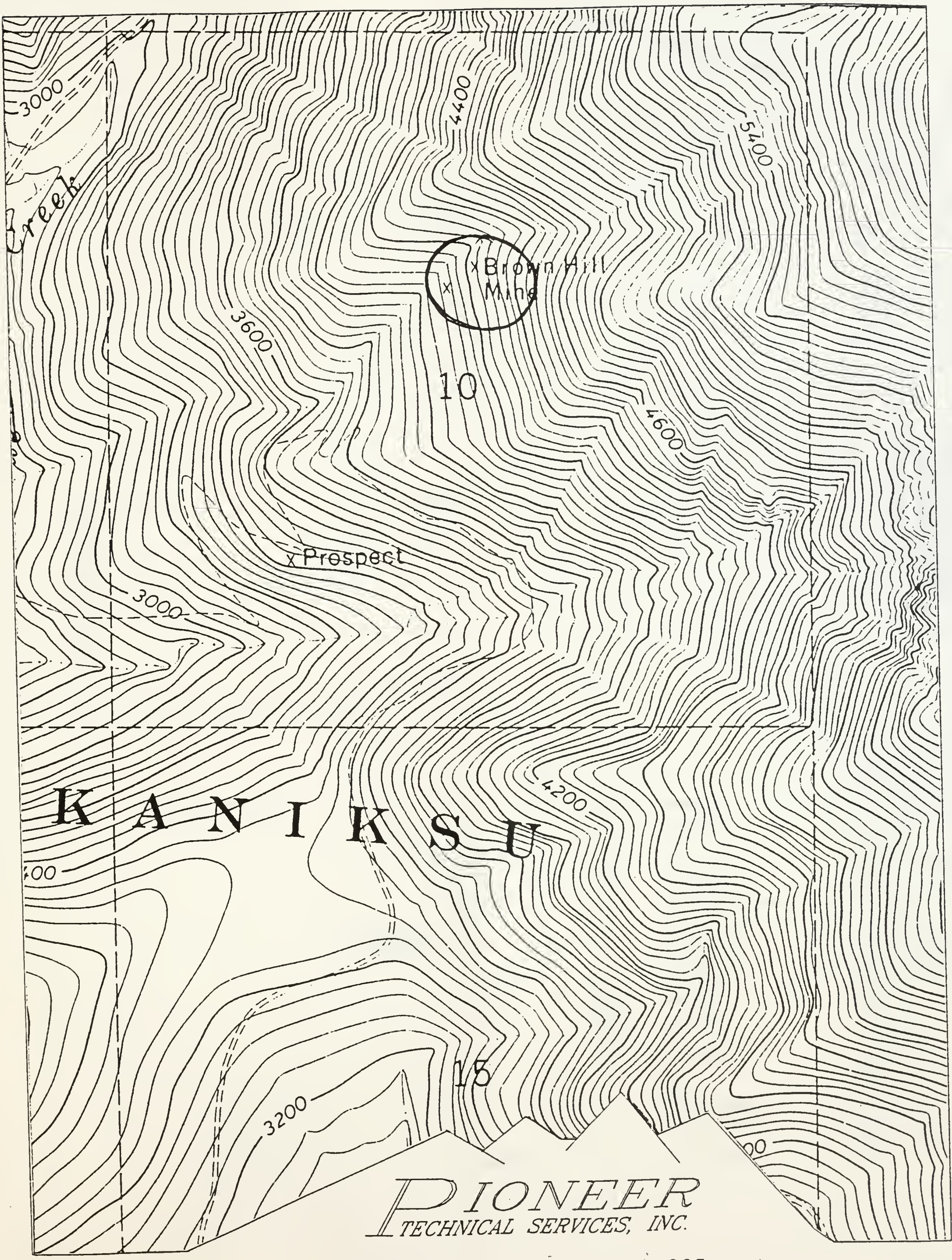
Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology 11/10/1993
Water Well Log Data

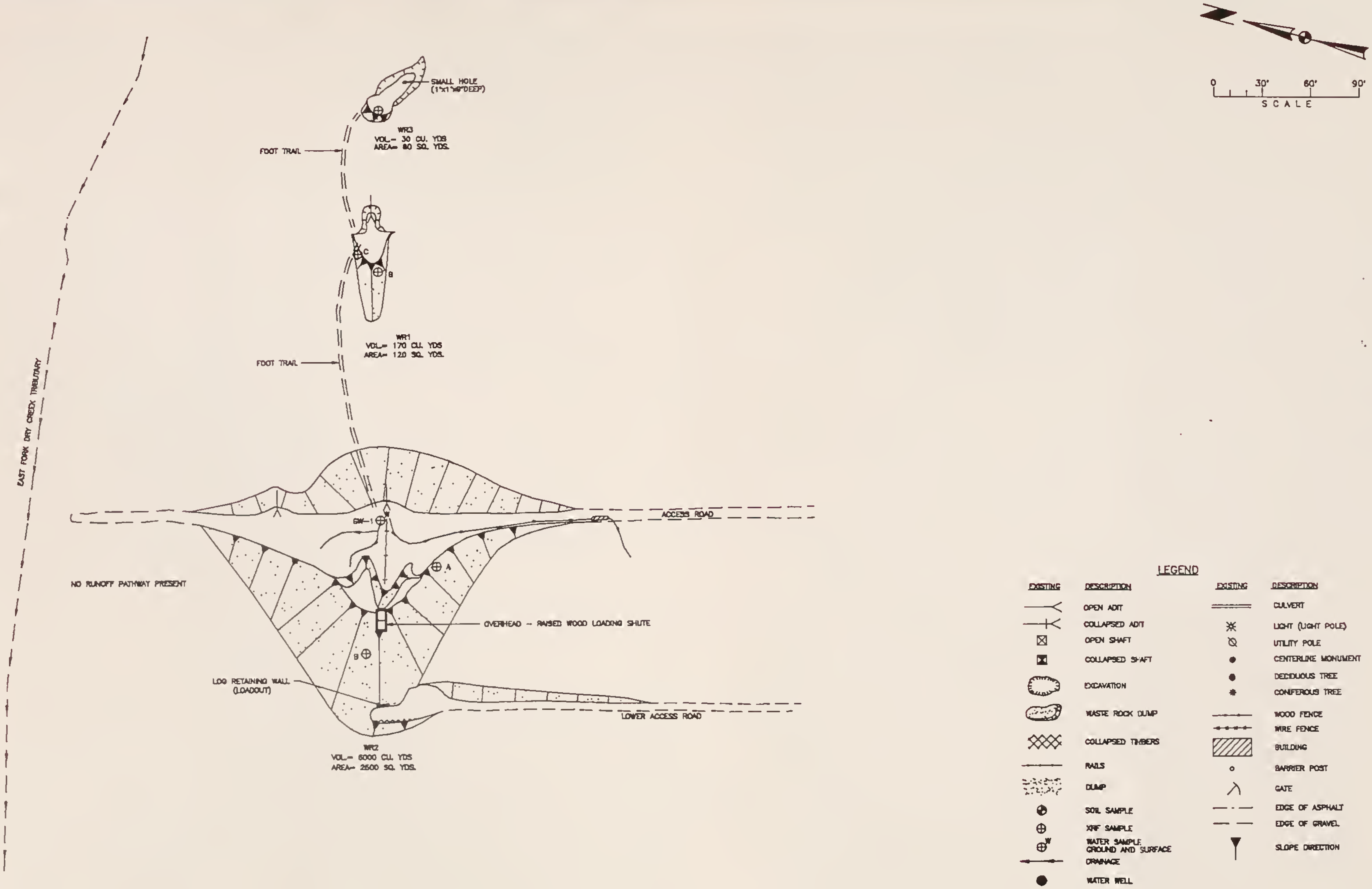
l No.	Location	Depth	Yield	Static Water Level
1393	27N 34W 02 B	180.0	5.0	92.00



PIONEER
TECHNICAL SERVICES, INC.

BROKEN HILL, P.A. NO. 45-005

T27N, R34W, SECTION 10
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	═	CULVERT
—+<	COLLAPSED ADIT	☀	LIGHT (LIGHT POLE)
⊠	OPEN SHAFT	⊘	UTILITY POLE
■	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
⬭	EXCAVATION	●	DECIDUOUS TREE
⬭	WASTE ROCK DUMP	✱	CONIFEROUS TREE
XXX	COLLAPSED TIMBERS	—·—·—	WOOD FENCE
—·—·—	RAILS	—•—•—	WIRE FENCE
∴	DUMP	▨	BUILDING
◕	SOIL SAMPLE	○	BARRIER POST
⊕	XRF SAMPLE	⋀	GATE
⊕W	WATER SAMPLE GROUND AND SURFACE	— · —	EDGE OF ASPHALT
←—	DRAINAGE	— —	EDGE OF GRAVEL
●	WATER WELL	▼	SLOPE DIRECTION

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BROKEN HILL MINE PA# 45-005
BLUE CREEK DISTRICT SANDERS COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MWC DATE 9/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

45-005.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	170	Southeast side of WR-1 near top	None	4.47 (S)	0.04	45-005-WR-1	08/03/93 0950	T-Metals, ABA
WR-1B	WR		West side of WR-1 straight out from adit	None	4.04 (S)	0.03			
WR-1C	WR		North side of WR-1 near top	None	6.61 (S)	0.03			
WR-2A	WR	6,000	South side of dump, southwest of adit near top	None	3.45 (S)	0.03	45-005-WR-2	08/03/93 1000	T-Metals, ABA
WR-2B	WR		North side of dump, northwest of adit near top	None	4.59 (S)	0.06			
WR-3	WR	30	West of cut near top of hill	None	4.04 (S)	0.04			
SS-1	BKGRND	N/A	Background soil sample approx. 50 feet above and 50 feet north of top of most cut	N/A	5.99 (S)	0.04	N/A	N/A	XRF Analysis

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 45-005-WR-1 is composite of WR-1A through -1C, and WR-3. 45-005-WR-2 is composite of WR-2A and -2B. See Holliday (45-009) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No ___, Number: 1 Identification: Adit #2

Filled shafts: Yes ___, No X, Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X, Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes X, No ___;
Number of well logs: 35

Distance to nearest well used for drinking? Approx. 2.1 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable ___, Possible X, Unlikely ___.
Metal values in dumps are high; water from adit drains onto dump an
vanishes.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	From flow out of Adit #2	25 gpm (E)	8.71	75	275	6.3	25	N/A	45-005-GW-1	08/03/93 1830	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Split was collected for owner.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s):

Dry streambeds: Yes X, No___, Name(s): Intermittent tributary to the East Fork Dry Creek approximately 100 feet north of the site.

Other surface water: Yes____, No X, Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
0 feet; Water from Adit #2 flows over WR-2 and disappears.

Surface water draining onto or through waste sources: Yes X, No____,
Describe: Water from Adit #2 flows over WR-2 and disappears.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Stock watering, possible fishery

Observed erosional/sedimentation/stream turbidity problems? Yes_____,
No X, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC $\mu S/cm$ @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

*FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
$pH \leq 5.0$	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 2.1 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Flammang, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	pH	Dry	1,080	864	Yes	Low
WR-2	pH; SO3	Dry	22,500	22,275	Yes	Low
WR-3	pH	Dry	720	720	Yes	Low
Adit #2	Algae	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes___, No X , Describe:________

Accessibility - Fences, warning signs, closed roads? There is a locked gate approx. 1/4 mile after the turnoff (F.R. 2290) from East Fork Blue Creek (F.R. 409).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment______________
Wilderness Area - Yes___, No X , Comment______________
T&E Species Habitat - Yes X , No___, Comment Grizzly
Bat Habitat - Yes___, No X , Comment______________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High X , Medium___, Low___
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:___

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 1 , types and locations: Slope behind Adit #1 is steep.

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 2 , types and locations: WR-1 and WR-2 have steep slopes, are unvegetated, and at angle of repose.

Fire and/or Explosion hazards: Yes___, No X , Explain:______________

Bibliography

MBMG, Mines and Mineral Deposits (Except Fuels), Sanders County, Montana, Bulletin 34, Written by F.A. Crowley, May 1963, pp. 14-15.

MBMG, State Technical Services Mine Visit Report for Broken Hill, Prepared by K.T. Bondurant, June 27, 1967.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Broken Hill, Prepared by Northern Engineering and Testing, August 7, 1988.

USGS, Geology and Ore Deposits of the Libby Quadrangle, Montana, Bulletin 956, Written by Russell Gibson, Date Unknown.

USGS, Topographic Map, Heron, Montana, 7 1/2 minute Quadrangle, 1966.

LABORATORY ANALYTICAL DATA

BROKEN HILL
PA NO. 45-005

Broken Hill PA# 45-005
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/03/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-005-WR-1	1140	27.9	15.2	7.25	5.25	342 J	94400	27.2 J	992	3.84	55900 J	344	9600	NR
45-005-WR-2	508	19.8	26	5.86	4.5	140 J	44200	2.53 J	426	6.23	18700 J	61.3	11400	NR
BACKGROUND	8.68	142	0.6 U	10.4	10.5	21.2 J	22100	0.059 J	710	14.4	33.8 J	6.84 U	78.2	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
45-005-WR-1	2.80	87.5	-5.78	-93.3	1.86	0.08	0.86	2.50	-8.28
45-005-WR-2	2.46	76.9	-4.12	-81.0	0.59	0.15	1.72	4.69	-8.81

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45-005-GW-1	30.4	2.01 U	2.57 U	9.7 U	6.83 U	2.97	69.6	0.044 J	15.2	12.7 U	107	30.7 U	867	23.4

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
45-005-GW-1	52	6.7	< 5	< 0.05	NR

LEGEND

WR1 - Composite of subsamples WR 1A, 1B, 1C, and 3.
WR2 - Composite of subsamples WR 2A and 2B.
BACKGROUND - From the Holliday Mine (45-009-SS-1).
GW1 - From the flow out of adit #2.

XRF ANALYSIS RESULTS

BROKEN HILL
PA NO. 45-005

Mine Name: Broken Hill PA# 45-005
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
45-005-SS-1		8954.69	8324.01	2567.26		3780.19	25954.6			369.353	52.8292 *	177.798
45-005-WR1-A	365.038 *	14752.2	1300.84	1259.48	203.588 *	1568.44	94982.8	550.725 *	98.4646 *	8067.61		27.5093 *
45-005-WR1-B	621.981 *	6090.21	997.152	437.957			89196.9	674.602	400.884	5482.23		38.6474 *
45-005-WR1-C		26241.3	1398.52	2106.73	174.768 *	4204.74	32126.4		86.1975 *	2979.45	230.7 *	18.1062 *
45-005-WR2-A		18830.4	945.541	1544.67		1060.29 *	65176.6		173.514 *	4655.63		21.7083 *
45-005-WR2-B		16079.5	2994.29	2090.41		1134.57 *	51254.8		142.261 *	2030.36		54.2273
45-005-WR-1-COMP		10866.8	2195.92	1180.72		1529.46 *	110745	918.133 *	406.608	5352.95		64.3026
45-005-WR-2-COMP	383.543 *	17142.4	2159.34	1725.75		663.145 *	65835.8		171.66 *	5517.7		39.3539
45-005-WR-2-COMP-DUP		16466.6	2236.71	1724.56		891.663 *	68796.6	432.031 *	175.765 *	3046.92		37.4987
45-005-WR-3	482.43 *	5549.98	3732.81	1165.8			181063	1455.75 *	597.114	5064.06		98.72

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
45-005-SS-1	186.205			455.401	74.2341			270.072			10.1168 *
45-005-WR1-A	198.968			16486.4	125.755		128.867 *	140.934	180.738 *		
45-005-WR1-B	130.446			43946.3	83.04 *	255.897 *	201.859	48.8326 *			
45-005-WR1-C	229.568			1158.45	197.226			304.392			21.5592 *
45-005-WR2-A	217.387			11575.7	181.219		76.9297 *	174.889			33.8282 *
45-005-WR2-B	244.608			12926.9	170.8		69.382 *	413.322			28.4652 *
45-005-WR-1-COMP	187.831			34122.8	99.3553 *	251.935 *	636.824	125.317	231.406 *		
45-005-WR-2-COMP	239.503			15142.1	175.841		100.177 *	257.347			33.586 *
45-005-WR-2-COMP·	251.803			14008.6	167.834		155.472 *	296.306			24.3571 *
45-005-WR-3	136.79			47270.2			1911.44	89.8487 *	616.526 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BROKEN HILL
PA NO. 45-005

AIMSS SCORESHEET

SITE NAME: BLUEBIRD
PA NUMBER: 41-009

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.050
6	GW - TARGETS	WELLS - 1 MI. x 2.5		287.5
7		WELLS - 1 TO 4 MI		991
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	1283.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	12835
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.057
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	678
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.006
29	AIR - TARGETS	POPULATION - 4 MILES		300
30		NEAREST RESIDENCE		5
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	305
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	183
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		200
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.005
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	35
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	44
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.14**

			SITE NAME:	BLUEBIRD
LINE NO.			PA NUMBER:	41-009
		SITE SAFETY		
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	200
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	275
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	35
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**48.13**

45-005, #19: WR-1 and Adit (collapsed) at upper workings, facing north

45-005, #20: WR-2, facing north

45-005, #21: Adit #2 with discharge; GW-1 sample location

PLAINS

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MONTRO GOLD PA#: 45-010

Date: August 6, 1993 Time: 1100-1800

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Calm; partly cloudy; Approx. 75°F; scattered showers; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #14 WR-2; #15 Adit #1; #16 WR-1, facing southeast; #17 WR-1, facing southwest. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close HMO; grade, amend, and revegetate dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MONTRO GOLD PA#: 45-010

Legal Description: T 19N ;R 26W ;Sec. 3 , SW1/4 NW1/4 ___1/4

County: SANDERS Mining District: PLAINS

Latitude: N 47° 26' 08" Longitude: W 114° 54' 00"

Primary Drainage Basin and Code: Clark Fork River/17010213
Secondary Drainage Basin: Combest Creek

USGS Quadrangle map name(s): Plains

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Mary Lynn Vanderhoff, Box 426, Plains, MT 59859. (406) 826-3192; Lolo National Forest.

Relationship to other mines/sites in the area/district: Close to prospects associated with Letterman Claim.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 2760'-2800' , Slope 10°-20° , Aspect Northwest

Land use: Mining X , Recreational X , Residential X , Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 3 acres.
Dimensions: Site dimensions are 500 feet x 300 feet.

Predominant vegetation types: Ponderosa pine, Douglas fir, spotted knapweed

Access: roads - good___,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 77 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The Montro Gold is not situated in a drainage but is located on a hillside above the broad historic Clark Fork River floodplain. The primary formation is the Prichard comprised of light and dark gray argillites. The lower Ravalli Formation overlies the Prichard Formation in this area.

Mining/milling history, ore type/tenor, host rock, gangue: No historic data is available on the mine. It has been worked within the last 10 years. Early mining occurred in the 1910's in the area.

Mine Operation?
Shafts - Yes___, No X, # ___, Comment
Adits - Yes X, No___, # 2, Comment One caved; one open
Pits - Yes___, No X, # ___, Comment
Placers - Yes___, No X, # ___, Comment
Other - Yes___, No X, # ___, Comment

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

11/01/1993

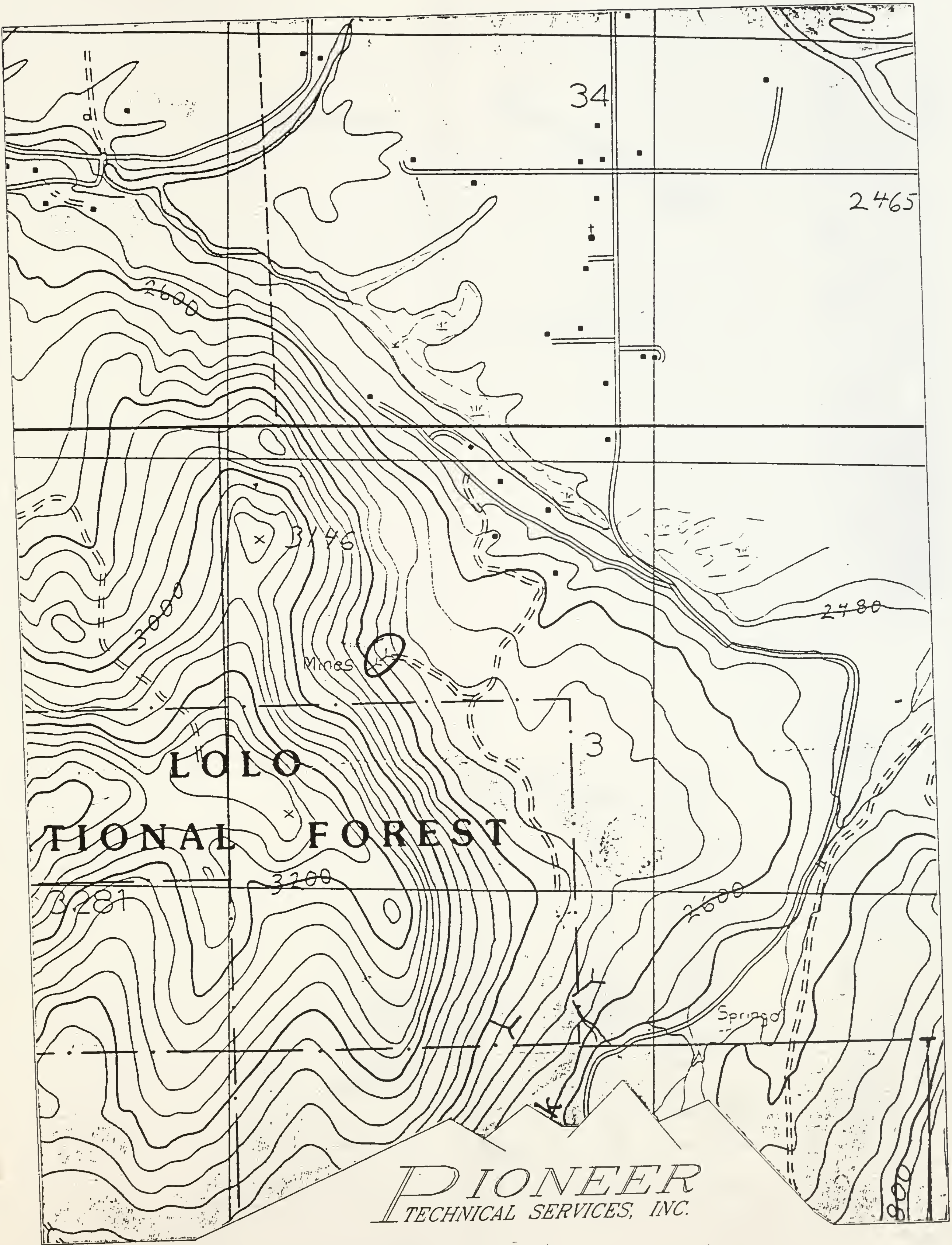
Well No.	Location	Depth	Yield	Static Water Level
M:74141	19N 26W 02 AAA	250.0	7.0	100.00
M:74143	19N 26W 02 BBB	17.0	75.0	5.00
M:74142	19N 26W 02 BBB	20.0	650.0	10.00
M:74144	19N 26W 02 BCDC	10.0	100.0	Flowing
M:74145	19N 26W 02 DB	26.0	30.0	0.00
M:74146	19N 26W 03 ABB	10.0	10.0	6.00
M:74147	19N 26W 03 ACB	163.0	15.0	133.00
M:74148	19N 26W 03 B	120.0	1.0	68.00
M:74149	19N 26W 03 B	260.0	1.0	120.00
M:74150	19N 26W 03 B	120.0	0.0	43.00
M:122690	19N 26W 03 BAA	35.0	40.0	12.00
M:74151	19N 26W 03 BAA	33.0	30.0	10.00
M:74153	19N 26W 03 BAA	35.0	50.0	14.00
M:126279	19N 26W 03 BAA	35.0	40.0	10.00
M:74152	19N 26W 03 BAA	36.0	50.0	14.00
M:122691	19N 26W 03 BAA	35.0	40.0	10.00
M:74154	19N 26W 03 BAB	30.0	30.0	10.00
M:74155	19N 26W 03 BB	156.0	16.0	30.00
M:75237	20N 26W 33	42.0	60.0	15.00
M:75238	20N 26W 33 ACBA	18.0	300.0	15.00
M:75239	20N 26W 33 ADAB	26.0	10.0	15.00
M:75240	20N 26W 33 ADB	18.0	400.0	15.00
M:75241	20N 26W 33 BCCC	118.0	30.0	99.00
M:75242	20N 26W 33 DAA	18.0	400.0	15.00
5243	20N 26W 33 DADB	24.0	10.0	15.00
75244	20N 26W 33 DB	24.0	3.0	12.00
M:125829	20N 26W 34	60.0	30.0	15.00
M:75247	20N 26W 34	31.0	30.0	13.00
M:75245	20N 26W 34	31.0	30.0	10.00
M:75249	20N 26W 34	40.0	40.0	11.00
M:75248	20N 26W 34	16.0	60.0	14.00
M:75246	20N 26W 34	31.0	30.0	13.00
M:75250	20N 26W 34 ACB	29.0	50.0	12.00
M:75251	20N 26W 34 ACCA	14.0	300.0	10.00
M:75252	20N 26W 34 ACCB	29.0	50.0	22.00
M:75253	20N 26W 34 ACCB	25.0	50.0	19.00
M:75254	20N 26W 34 ACCC	20.0	40.0	19.00
M:75255	20N 26W 34 ACD	16.0	100.0	12.00
M:75256	20N 26W 34 ADC	20.0	360.0	14.00
M:75258	20N 26W 34 BBA	50.0	0.0	0.00
M:75257	20N 26W 34 BBA	20.0	0.0	0.00
M:75260	20N 26W 34 BCA	17.0	500.0	15.00
M:75259	20N 26W 34 BCA	31.0	30.0	13.00
M:75261	20N 26W 34 BCB	30.0	150.0	13.00
M:75262	20N 26W 34 BCC	27.0	200.0	4.00
M:75263	20N 26W 34 BCCA	37.0	10.0	12.00
M:75264	20N 26W 34 BD	0.0	200.0	18.00
M:75265	20N 26W 34 BDDC	15.0	1.0	10.00
M:75266	20N 26W 34 C	42.0	30.0	6.00
5267	20N 26W 34 CA	21.0	50.0	9.00
75268	20N 26W 34 CA	39.0	90.0	12.00
M:75269	20N 26W 34 CAC	16.0	30.0	2.00
M:75270	20N 26W 34 CAD	31.0	50.0	8.00
M:75271	20N 26W 34 CBA	0.0	500.0	2.00
M:75272	20N 26W 34 CBAB	17.0	250.0	15.00

Montana Bureau of Mines and Geology
Water Well Log Data

11/01/1993

Well No.	Location	Depth	Yield	Static Water Level
M:75277	20N 26W 34 DBBB	22.0	40.0	20.00
M:75276	20N 26W 34 DBBB	20.0	75.0	12.00
M:75278	20N 26W 34 DCC	15.0	1.0	8.00
M:75279	20N 26W 34 DCCC	12.0	1.0	8.00
M:75280	20N 26W 34 DDD	17.0	0.0	8.00
M:75281	20N 26W 35 AB	98.0	50.0	68.00
M:75282	20N 26W 35 ABC	80.0	20.0	40.00
M:75283	20N 26W 35 ACC	80.0	10.0	60.00
M:75284	20N 26W 35 ACCA	35.0	500.0	20.00
M:75285	20N 26W 35 ACCA	48.0	1.0	20.00
M:75286	20N 26W 35 BA	34.0	25.0	23.00
M:75287	20N 26W 35 BCD	12.0	400.0	5.00
M:75288	20N 26W 35 C	40.0	20.0	12.00
M:75289	20N 26W 35 CA	20.0	350.0	13.00
M:75290	20N 26W 35 CBC	21.0	50.0	12.00
M:75291	20N 26W 35 CCC	21.0	60.0	7.00
M:75292	20N 26W 35 CDA	60.0	60.0	12.00
M:75293	20N 26W 35 CDB	42.0	60.0	15.00
M:75294	20N 26W 35 DDC	200.0	30.0	120.00

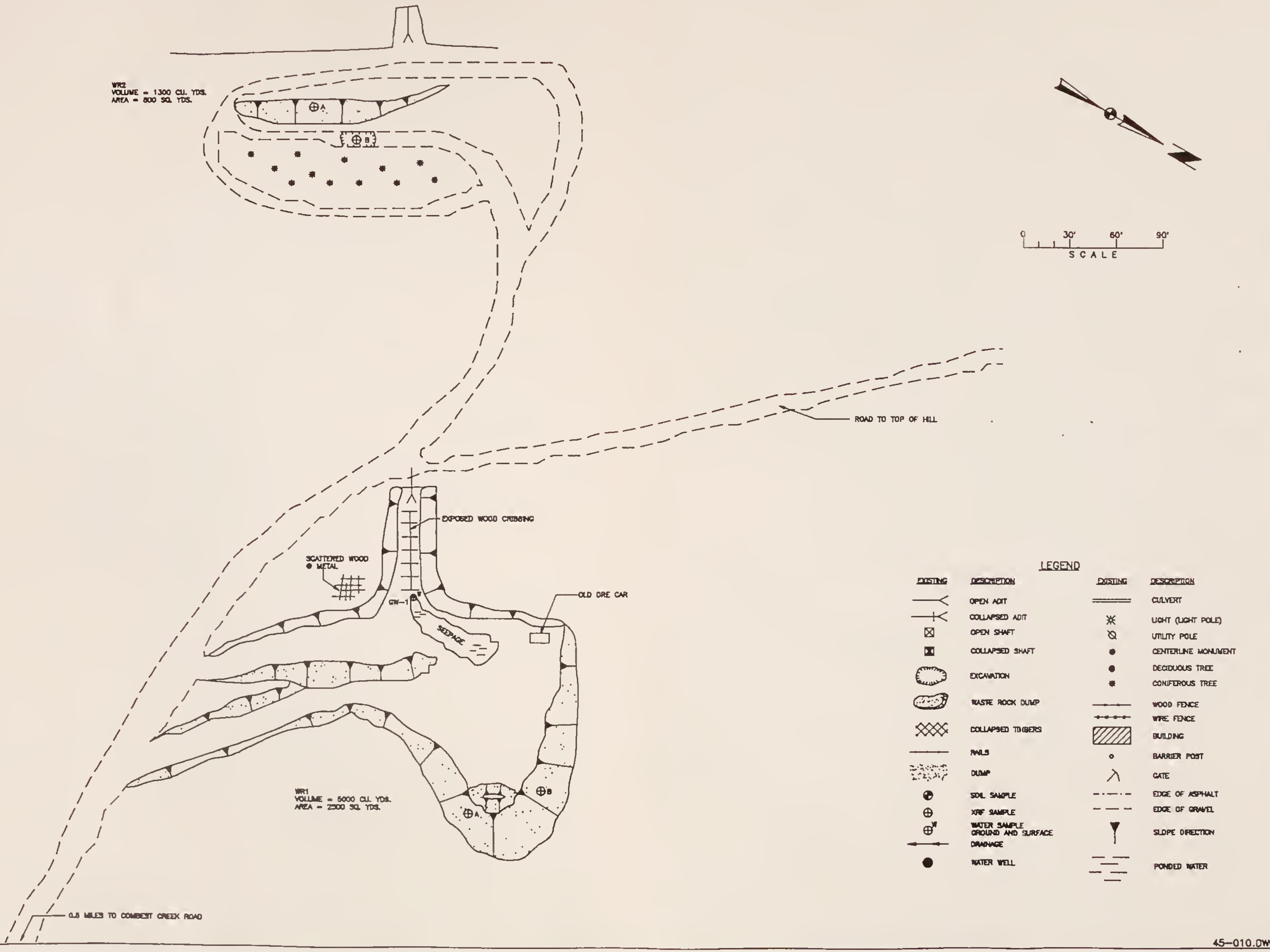
M:75273	20N 26W 34 CCAD	25.0	20.0	8.00
M:75274	20N 26W 34 CDB	40.0	30.0	7.00
M:75275	20N 26W 34 DBA	20.0	16.0	12.00



PIONEER
TECHNICAL SERVICES, INC.

MONTRO–GOLD, P.A. NO. 45–010

T19N, R26W, SECTION 03
SCALE: 1" = 1000'



45-010.DWG

DRAWN MEE DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MONTRO GOLD PA# 45-010
PLAINS DISTRICT SANDERS COUNTY

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	5,000	South side of dump more recently mined material	None	4.64 (S)	0.04	45-010-WR-1	08/06/93 1715	T-Metals, ABA
WR-1B	WR		Old dump material north side	None	4.69 (S)	0.015			
WR-2A	WR	1,300	Center of upper main dump area near adit	None	5.77 (S)	0.035			
WR-2B	WR		Upper workings small pile below main dump	None	4.67 (S)	0.06	45-010-WR-2	08/06/93 1730	T-Metals, ABA
SS-1	BKGRND	N/A	Background soil for Montro Gold and Lower Letterman	None	NM	NM	45-010-SS-1	08/06/93 1500	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 45-010-WR-1 is a composite of WR-1A, 1B, and WR-2A. 45-010-WR-2 is a grab of WR-2B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No ___, Number: 1 Identification: Adit #1 (lower adit)

Filled shafts: Yes ___, No X, Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X, Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes X, No ___;
Number of well logs: 344

Distance to nearest well used for drinking? 1/4 to 1/2 mile; houses in close proximity to mine are apparently on city water.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable ___, Possible X, Unlikely ___.
Analysis of adit discharge does not indicate elevated metals levels, but may pick up metals as it infiltrates down through the dump.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm at 25°C	Eh mV	Temp °C	ALK. mg/L as CaCO^3	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Lower adit discharge	2 to 3 gpm (E)	8.36	250	235	13.2	98	N/A	45-010-GW-1	08/06/93 1300	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes X , No____, Name(s)/Description: Adit discharge flows out onto dump end then infiltrates down in.

Waste materials within any floodplain: Yes____, No X Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?_
N/A

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Adit discharge

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
N/A

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

*FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000_X_; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 400 feet

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	Low pH	Dry	22,500	20,000	No	None
WR-2	SO3; Low pH	Dry	7,200	6,480	No	None

Notes and Clarifications: ______________________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe: Residence approximately 400 feet below the mine.

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300_X_;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Posted "Private Property" signs

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________________
Wilderness Area - Yes___, No_X_, Comment____________________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle, Peregrine
Bat Habitat - Yes___, No_X_, Comment____________________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 3
Sport Fishery Classification - 2

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___
Upper adit is gated.

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________

Bibliography

MBMG, Montro Gold, Sanders County, Form 39, 1972-1984.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Montro Gold, Prepared by Northern Engineering and Testing, August 28, 1988.

USGS, Topographic Map, Plains, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

MONTRO GOLD
PA NO. 45-010

Montro Gold PA# 45-010
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/06/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45–010–WR–1	6 J	43.7	1.3	22.7	7.2	125 J	34400	1.51	733 J	18	4280	5 UJ	57	NR
45–010–WR–2	7 J	30	1.7	13.1	4.3	345 J	41000	0.306	492 J	9	27500	28	17	NR
BACKGROUND	4.44 U	234	1.06	8.15	7.26	8.33	12900	0.037	987	9.72	21.3	5.79 U	95.2	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
45–010–WR–1DUF	0.05	1.56	4.38	2.82	0.03	<0.01	0.02	0.00	4.38
45–010–WR–1	0.06	1.87	4.42	2.54	0.03	0.01	0.02	0.31	4.11
45–010–WR–2	0.21	6.56	2.15	–4.41	0.19	0.01	0.01	0.31	1.84

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45–010–GW–1	2.92 J	25.7	2.57	9.7 U	6.83 U	5.13	585 J	0.230 JX	53.2	12.7 U	23.2 J	30.7 U	13.8 J	78

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
45–010–GW–1	141	6.7	11	0.37	NR

LEGEND

WR1 – Composite of subsamples WR 1A, 1B, and 2A.
WR2 – Sample of the WR2B subsample.
BACKGROUND – From the Montro Gold Mine (45–010–SS–1).
WR1DUP – Duplicate of the sample 45–010–WR–1.
GW1 – Lower adit discharge.

XRF ANALYSIS RESULTS

MONTRO GOLD
PA NO. 45-010

Mine Name: Montro Gold PA# 45-010
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
45-010-SS-1		15270	9625.69	2740.19		1080.98	19928.2			167.846	25.4943 *	186.582
45-010-SS-1-DUP		14707.3	9816.31	2732.28		1260.11	19587.2			159.869	23.7778 *	181.842
45-010-WR1-A		20237.4	2086.16	1516.89	156.048 *	974.854 *	37939.8		89.9942 *	118.204 *		43.6109
45-010-WR1-B		23464.9	2894.64	1772.23		830.928 *	52911.5		199.974	57.9729 *		58.8651
45-010-WR2-A		30640.1	3774.43	2496.26	72.1566	1001.87	32681.5	168.564	79.3604	95.9113		50.9638
45-010-WR2-B		18850	4401.37	1240.11		779.501 *	49854.3	433.562 *	272.506	61.3208 *		38.0188
45-010-WR-1-COMP		23182.9	2954.68	1858.41		937.469 *	41452.8		119.945 *	95.2422 *		46.3419

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
45-010-SS-1	301.495				88.6016			403.498			12.613 *
45-010-SS-1-DUP	293.095				89.3745			385.287	70.9668 *		11.5846 *
45-010-WR1-A	193.865			2027.61	119.607			391.995			
45-010-WR1-B	226.429			3339.92	115.834			489.352			16.6344 *
45-010-WR2-A	275.731			2726.09	133.963			535.031	120.355		13.6023
45-010-WR2-B	162.686			14579.2	83.9345			294.501	147.717 *		27.6232 *
45-010-WR-1-COMP	235.398			2794.22	126.943			493.336			20.1915 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MONTRO GOLD
PA NO. 45-010

AIMSS SCORESHEET

SITE NAME: MONTRO GOLD
PA NUMBER: 45-010

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	21.262
6	GW - TARGETS	WELLS - 1 MI. x 2.5		192.5
7		WELLS - 1 TO 4 MI		267
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	464.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	3950480
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	23.446
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		5
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	10
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	9378
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	20
27		LIKELIHOOD SCORE	LINES 25 + 26C	20
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.775
29	AIR - TARGETS	POPULATION - 4 MILES		1000
30		NEAREST RESIDENCE		10
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	1025
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	15888
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.702
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		100
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	110
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	15444
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**39.91**

LINE NO.		SITE SAFETY		SITE NAME: MONTRO GOLD PA NUMBER: 45-010
1	THREAT	ACCESSIBILITY		10
2	HAZARDS	OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4		UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9	TARGETS	POPULATION - 1 MILE		100
10		NEAREST RESIDENCE		10
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	110
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**55.00**

45-010, #14: WR-2 (upper)

45-010, #15: Adit #1

45-010, #16: WR-1, facing southeast

45-010, #17: WR-1, facing southwest

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: DEE CREEK MINE PA#: 45-041

Date: August 6, 1993 Time: 1200

Field Team Leader: Flammang, Pioneer

Sampling Personnel: Belanger, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (80°F); sunny; slight breeze; thunderstorm with hail during investigation; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #18: Adit #2 HMO (no dump, too steep); #19: SW-1 and SE-1 sample location downgradient; #20: SW-2 and SE-2 sample location upgradient; #21: GW-1 sample location and Adit #1 (collapsed); #22: WR-1.
Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is approx. 1.5 miles on Forest Service trail 398 from the parking area at the end of West Fork Swamp Creek Road (F.S. 217). Adit #1 lies directly adjacent to the trail approx. 55 feet up from Dee Creek.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close upper inclined shaft and revegetate; pull toe of WR-1 away from creek and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): DEE CREEK MINE PA#: 45-041

Legal Description: T 20N ;R 28W ;Sec. 25 , SE1/4 SE1/4 ___1/4

County: SANDERS Mining District: PLAINS

Latitude: N 47° 27' 30" Longitude: W 115° 05' 40"

Primary Drainage Basin and Code: Swamp Creek/17010213
Secondary Drainage Basin: Dee Creek

USGS Quadrangle map name(s): Sunset Peak

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Lolo National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4080' , Slope Steep ,
Aspect South

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 0.07 acres.
Dimensions:

Predominant vegetation types: Adjacent slopes had Douglas fir, Ponderosa pine, cedar, chokecherries, and grasses.

Access: roads - good___,poor X ,4wd___,trail X .
Other logistical considerations (proximity to other sites). Walk 1.5 miles to site; USFS Road 7579 is completely overgrown with 6 to 8 feet high pine trees.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies immediately above Dee Creek on its north bank. Dee Creek flows east through the site to its confluence with perennial Swamp Creek 1.5 miles to the southeast. The site lies in argillites; quartz vein material in dump.

Mining/milling history, ore type/tenor, host rock, gangue: No information in literature. Both adits had quartz vein float in waste rock.

Mine Operation?

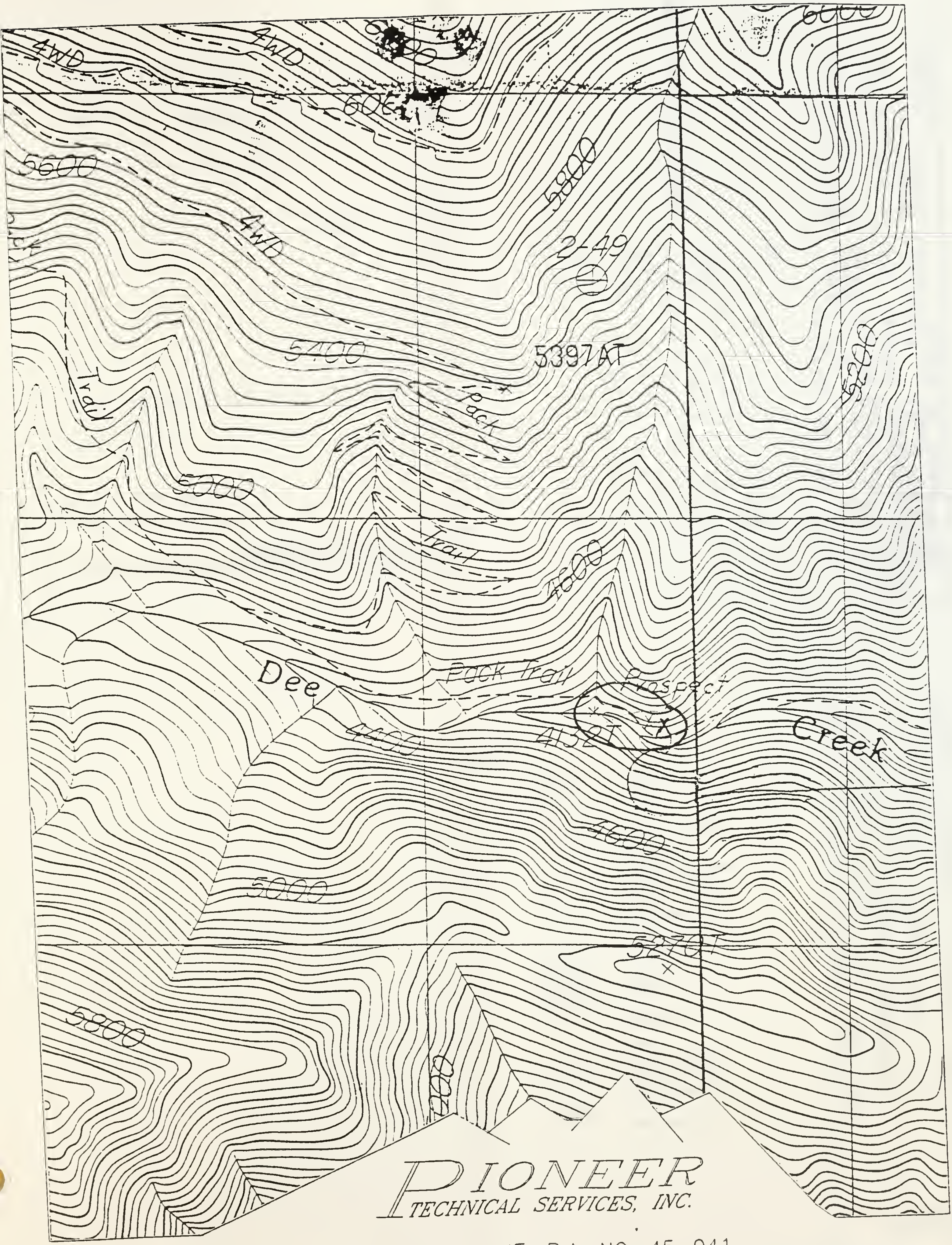
Shafts -	Yes___,	No X ,	# ____,	Comment
Adits -	Yes X ,	No___,	# 2 ,	Comment 1 inclined adit open; 1 caved
Pits -	Yes___,	No X ,	# ____,	Comment
Placers -	Yes___,	No X ,	# ____,	Comment
Other -	Yes___,	No X ,	# ____,	Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

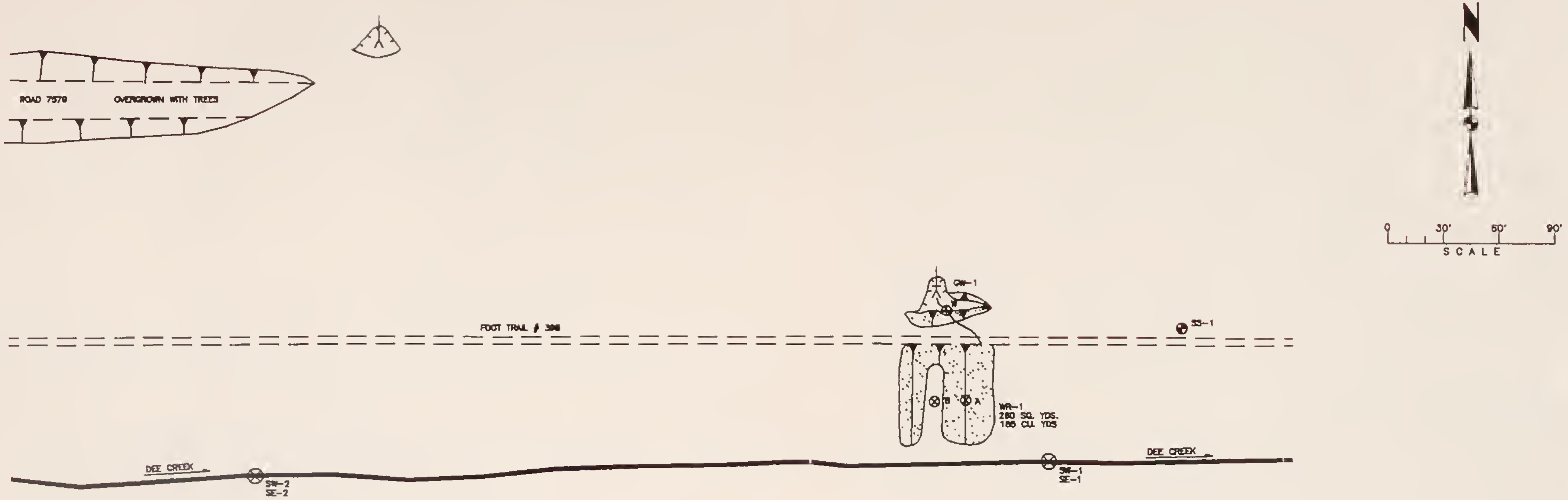
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

DEE CREEK MINE, P.A. NO. 45-041

T20N, R28W, SECTION 25
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	======	CULVERT
—+<	COLLAPSED ADIT	☼	LIGHT (LIGHT POLE)
☒	OPEN SHAFT	⊘	UTILITY POLE
■	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
○	EXCAVATION	●	DECIDUOUS TREE
○	WASTE ROCK DUMP	✱	CONIFEROUS TREE
✕✕✕	COLLAPSED TIMBERS	—•—•—	WOOD FENCE
—•—•—	RAILS	—✦—✦—	WIRE FENCE
⁘	DUMP	▨	BUILDING
◕	SOIL SAMPLE	∘	BARRIER POST
⊕	XRF SAMPLE	⋏	GATE
⊕ʷ	WATER SAMPLE GROUND AND SURFACE	— · —	EDGE OF ASPHALT
—◆—◆—	DRAINAGE	— —	EDGE OF GRAVEL
●	WATER WELL	▼	SLOPE DIRECTION

DRAWN MWC DATE 9/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

DEE CREEK MINE PA# 45-041
PLAINS DISTRICT SANDERS COUNTY

SHEET NO.

45-041.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)[*]	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	250	Below Adit #1, 25 feet up from river	None	3.7 (D)	0.03	45-041-WR-1	08/06/93 1700	T-Metals, ABA
WR-1B	WR		Approx. 10 feet west of WR-1A	None	4.4 (D)	0.04			
SS-1	BKGRND	N/A	Background soil 100 feet east on trail 398, just above trail	N/A	6.25 (D)	NM	45-041-SS-1	08/06/93 1415	T-Metals, ABA

[*] D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 45-041-WR-1 is composite of WR-1A and -1B.
NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 32

Distance to nearest well used for drinking? 3.5 to 4 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Metal values in dumps were very low; only a small seep from adit.

Other observations/notes: Water from adit flows approximately 3 feet before disappearing into the ground.

GROUNDWATER INVENTORY FORM

SAMPLERS: Flammang, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	From seep just below caved mouth of Adit #1	1 gpm (E)	6.33	620	210	8.2	15	N/A	45-041-GW-1	08/06/93 1400	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	QA	QA/QC blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	45-041-GW-2	08/06/93 1445	T-Metals

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Dee Creek

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1 lies with toe just above Dee Creek in floodplain.

Approximate Flood frequency? ___1 yr, X 10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 25 cfs , Average Flow: 2.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? Approx. 2 feet lie between present toe of WR-1 and Dee Creek.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Adit #1 discharge flows for approx. 3 feet over WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, wetlands, stock watering

Observed erosional/sedimentation/stream turbidity problems? Yes _____, No X , Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: Flammang, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Approx. 50 feet downgradient of site	5.92	510	276	9.2	12	2.95 cfs (E)	45-041-SW-1	08/06/93 1310	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Approx. 50 feet downgradient of site	N/A	N/A	N/A	N/A	N/A	N/A	45-041-SE-1	08/06/93 1310	T-Metals
SW-2	SW	Approx. 100 feet upgradient of site	6.05	450	276	9.2	12	3.1 cfs (E)	45-041-SW-2	08/06/93 1334	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Approx. 100 feet upgradient of site	N/A	N/A	N/A	N/A	N/A	N/A	45-041-SE-2	08/06/93 1334	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 3.5 to 4 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Flammang, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	pH	Dry	1,665	1,000	No	None
Adit #1	Moss	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes X , No___, Describe: Hikers use USFS trail that passes through the site.

Accessibility - Fences, warning signs, closed roads? Unrestricted; site lies on a maintained Forest Service trail (HMO is well above the trail on a steep slope).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment____
Wilderness Area - Yes___, No X , Comment____
T&E Species Habitat - Yes___, No X , Comment____
Bat Habitat - Yes X , No___, Comment Possible

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High___, Medium X , Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations: Adit #2 lies approx. 20 to 25 feet above the end of abandoned Forest Service Road 7579.

Hazardous structures: Yes___, No X , Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____,
types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No X ,
Number____, types and locations: WR-1 is not any less stable than the surrounding talus slopes.

Fire and/or Explosion hazards: Yes___, No X , Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Dee Creek Mine, Prepared by Northern Engineering and Testing, August 28, 1988.

USGS, Topographic Map, Sunset Peak, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

DEE CREEK
PA NO. 45-041

Dee Creek PA# 45-041
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/06/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-041-SE-1	69 J	68.2	0.7 U	7.7	9	36.1 J	25800	0.048	355 J	15	19	8 UJ	67	NR
45-041-SE-2	32 J	62.8	0.6 U	8.1	9.8	16.1 J	28700	0.05	379 J	14	26	7 UJ	72	NR
45-041-WR-1	201 J	25.1	1.2	7	8.3	43.2 J	56100	0.955	200 J	7	82	5 UJ	44	NR
BACKGROUND	44 J	362	0.5 U	17.7	16.5	29.1 J	38500	0.044	611 J	38	42	6 UJ	147	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested; ND – No Data

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
45-041-WR-1	0.25	7.81	0.76	-7.05	0.23	<0.01	0.02	0.00	0.76

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45-041-GW-1	2.89 J	2.01 U	2.57 U	9.7 U	6.83 U	1.55 U	20.1 J	0.230 JX	4.08 U	12.7 U	1.22 U	30.7 U	8.17 J	15.1
45-041-GW-2	0.96 U	2.01 U	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.190 JX	4.08 U	12.7 U	1.22 U	30.7 U	7.57 U	0.1
45-041-SW-1	1.14 J	4.67	2.57 U	9.7 U	6.83 U	1.55 U	17.6 J	0.200 JX	4.08 U	12.7 U	1.78 J	30.7 U	16.5 J	9.8
45-041-SW-2	0.96 U	4.93	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.230 JX	4.08 U	12.7 U	1.77 J	30.7 U	12.3 J	9.8

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested; ND – No Data

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
45-041-GW-1	35	7.7	< 5.0	< 0.05	NR
45-041-GW-2	6	8.7	< 5.0	< 0.05	NR
45-041-SW-1	36	11	< 5.0	< 0.05	NR
45-041-SW-2	ND	ND	ND	< 0.05	NR

LEGEND

SE1 – Downgradient of site approx. 50'.
SE2 – Upgradient of site approx. 50'.
WR1 – Composite of subsamples WR1A and 1B.
BACKGROUND – From Dee Creek Mine (45-041-SS-1).

GW1 – From seep just below caved mouth of adit #1.
GW2 – QA/QC Blank.
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

DEE CREEK
PA NO. 45-041

Mine Name: Dee Creek PA# 45-041
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
45-041-SS-1		17689.2	15078	4118.59		337.068 *	39313		75.232 *	171.209	89.2586 *	251.65
45-041-SS-1-DUP		17603.9	15127.8	3715.47		369.19 *	38838.6	355.642 *	65.2845 *	216.467	73.6869 *	257.192
45-041-WR1-A		20641.7	2424.06	1687.58			108788		99.1965 *	48.4826 *	61.405 *	95.712
45-041-WR1-B		19916.6	2000.1	1568.42		381.239 *	103362		120.971 *	132.878 *	770.752	89.0807
45-041-WR-1-COMP		21630.4	2729.18	1796.19			108838	468.246 *	99.6424 *	87.2007 *	412.084	97.0718

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
45-041-SS-1	258.736			20.7692 *	125.748			471.782			11.3532 *
45-041-SS-1-DUP	265.851			30.165 *	120.457			506.186			9.80442 *
45-041-WR1-A	226.75			100.123	174.64			476.621			7.3609 *
45-041-WR1-B	244.011			91.5614	167.569			510.104	188.749 *		15.5204 *
45-041-WR-1-COMP	227.411			69.7071 *	190.192			561.379			13.6996 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

DEE CREEK
PA NO. 45-041

AIMSS SCORESHEET

SITE NAME: DEE CREEK MINE
PA NUMBER: 45-041

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.120
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		32
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	32.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1536
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.122
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	13
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	634
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	11
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.002
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	5
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	2
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.02**

SITE NAME: DEE CREEK MINE
PA NUMBER: 45-041

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**5.00**

45-041, #18: Adit #2 (HMO); no dump, too steep

45-041, #19: SW-1 and SE-1 sample locations

45-041, #20: SW-2 and SE-2 sample locations

45-041, #21: Adit #1 (collapsed); GW-1 sample location

45-041, #22: WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LOWER LETTERMAN PA#: 45-047

Date: August 6, 1993 Time: 0800-1100

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Calm; clear; warm (65°F); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #6: WR-3; #7: Stope; #8: Stope at WR-3; #9: Stope associated with WR-1 (actual Lower Letterman); #10: WR-1; #11: Northern stope; #12: WR-2.
Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Small prospects with HMO's and many other small prospects in the vicinity of these stopes. One upper dump is more volumous then the Lower Letterman.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Close HMO's; grade and revegetate dumps, if deemed necessary.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LOWER LETTERMAN PA#: 45-047

Legal Description: T 19N ;R 26W ;Sec. 3 , SW1/4 SE1/4 1/4

County: SANDERS Mining District: PLAINS

Latitude: N 47° 25' 43" Longitude: W 114° 53' 37"

Primary Drainage Basin and Code: Clark Fork River/17010213
Secondary Drainage Basin: Combest Creek

USGS Quadrangle map name(s): Plains

Mine Type/Commodities: Hardrock/Gold, Silver, Lead

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Mary Lynn Vanderhoff, Vanderhoff Reality, East Railroads, Plains, MT 59859. (406) 826-3837; Lolo National Forest.

Relationship to other mines/sites in the area/district: In close proximity to the Montro Gold Mine. Many other prospects in the area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 2600' , Slope 10°-15° , Aspect East

Land use: Mining X , Recreational X , Residential X , Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 0.3 acres.
Dimensions: 50 feet x 50 feet

Predominant vegetation types: Ponderosa pine, antelope bitter brush, chokecherry, knapweed

Access: roads - good___,poor___,4wd___,trail X .
Other logistical considerations (proximity to other sites). Walk 0.25 mile to reach mine from Combest Creek Road.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 77 well logs within 1 mile.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The mine is located on the west side of Combest Creek drainage, which is dry in the vicinity of the site. Water in Combest Creek would flow into Clark Fork River 1.5 miles away. The primary formation is the Prichard comprised of light and dark gray argillites. The lower Ravalli Formation overlies the Prichard Formation in this area.

Mining/milling history, ore type/tenor, host rock, gangue: The Letterman property was first mentioned in the literature in 1911 and consisted of 130 areas of patented ground. Galena and free gold are the chief economic minerals associated with the vein. The host rock is primarily shale or gray to black argillites of the Prichard Formation.

Mine Operation?
Shafts - Yes X, No ___, # 2, Comment Inclined shafts
Adits - Yes ___, No X, # ___, Comment
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes X, No ___, # ___, Comment Many other small exploration openings in the area

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

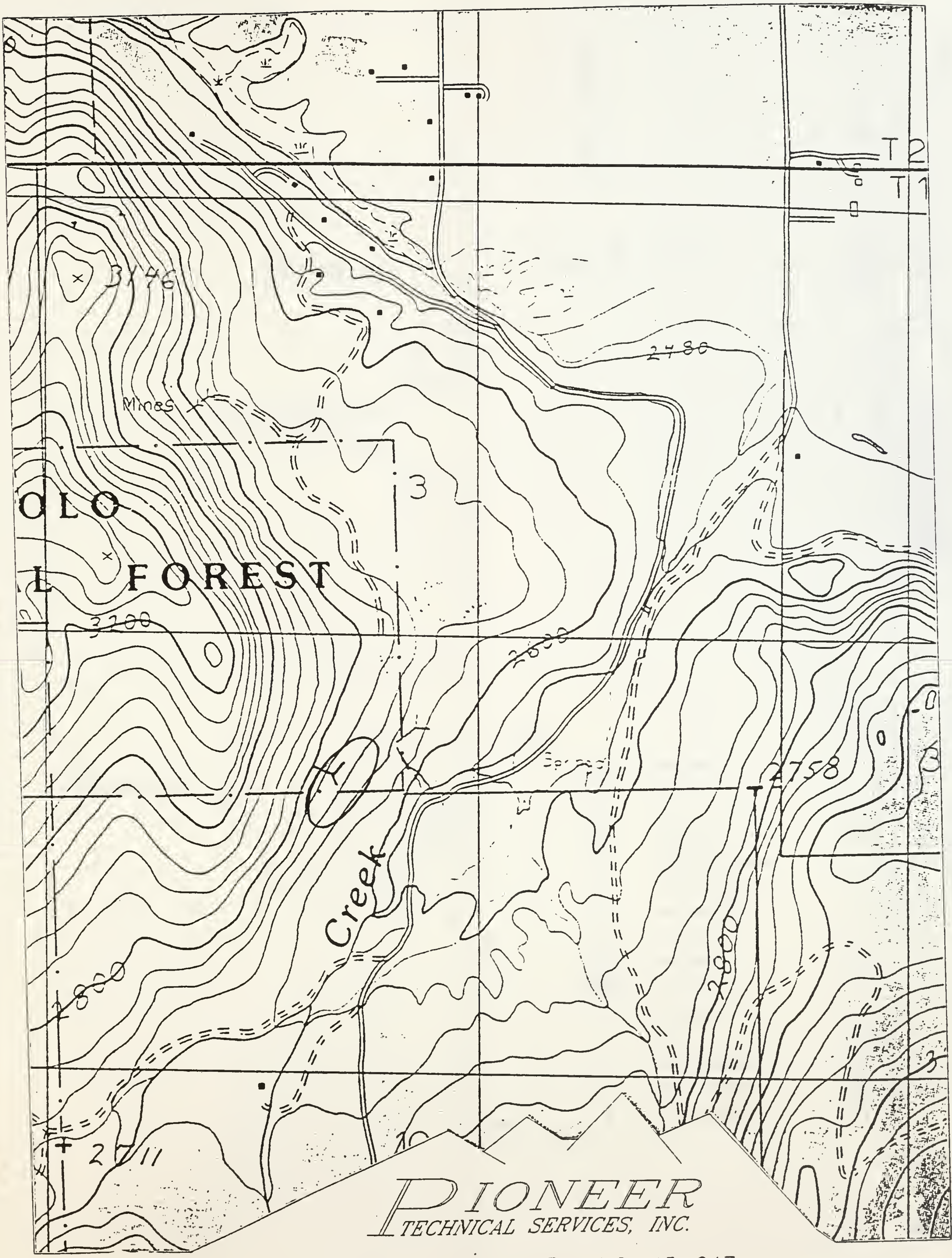
Montana Bureau of Mines and Geology 11/01/1993
Water Well Log Data

Well No.	Location	Depth	Yield	Static Water Level
M:74141	19N 26W 02 AAA	250.0	7.0	100.00
M:74143	19N 26W 02 BBB	17.0	75.0	5.00
M:74142	19N 26W 02 BBB	20.0	650.0	10.00
M:74144	19N 26W 02 BCDC	10.0	100.0	Flowing
M:74145	19N 26W 02 DB	26.0	30.0	0.00
M:74146	19N 26W 03 ABB	10.0	10.0	6.00
M:74147	19N 26W 03 ACB	163.0	15.0	133.00
M:74148	19N 26W 03 B	120.0	1.0	68.00
M:74149	19N 26W 03 B	260.0	1.0	120.00
M:74150	19N 26W 03 B	120.0	0.0	43.00
M:122690	19N 26W 03 BAA	35.0	40.0	12.00
M:74151	19N 26W 03 BAA	33.0	30.0	10.00
M:74153	19N 26W 03 BAA	35.0	50.0	14.00
M:126279	19N 26W 03 BAA	35.0	40.0	10.00
M:74152	19N 26W 03 BAA	36.0	50.0	14.00
M:122691	19N 26W 03 BAA	35.0	40.0	10.00
M:74154	19N 26W 03 BAB	30.0	30.0	10.00
M:74155	19N 26W 03 BB	156.0	16.0	30.00
M:75237	20N 26W 33	42.0	60.0	15.00
M:75238	20N 26W 33 ACBA	18.0	300.0	15.00
M:75239	20N 26W 33 ADAB	26.0	10.0	15.00
M:75240	20N 26W 33 ADB	18.0	400.0	15.00
M:75241	20N 26W 33 BCCC	118.0	30.0	99.00
M:75242	20N 26W 33 DAA	18.0	400.0	15.00
:75243	20N 26W 33 DADB	24.0	10.0	15.00
75244	20N 26W 33 DB	24.0	3.0	12.00
M:125829	20N 26W 34	60.0	30.0	15.00
M:75247	20N 26W 34	31.0	30.0	13.00
M:75245	20N 26W 34	31.0	30.0	10.00
M:75249	20N 26W 34	40.0	40.0	11.00
M:75248	20N 26W 34	16.0	60.0	14.00
M:75246	20N 26W 34	31.0	30.0	13.00
M:75250	20N 26W 34 ACB	29.0	50.0	12.00
M:75251	20N 26W 34 ACCA	14.0	300.0	10.00
M:75252	20N 26W 34 ACCB	29.0	50.0	22.00
M:75253	20N 26W 34 ACCB	25.0	50.0	19.00
M:75254	20N 26W 34 ACCC	20.0	40.0	19.00
M:75255	20N 26W 34 ACD	16.0	100.0	12.00
M:75256	20N 26W 34 ADC	20.0	360.0	14.00
M:75258	20N 26W 34 BBA	50.0	0.0	0.00
M:75257	20N 26W 34 BBA	20.0	0.0	0.00
M:75260	20N 26W 34 BCA	17.0	500.0	15.00
M:75259	20N 26W 34 BCA	31.0	30.0	13.00
M:75261	20N 26W 34 BCB	30.0	150.0	13.00
M:75262	20N 26W 34 BCC	27.0	200.0	4.00
M:75263	20N 26W 34 BCCA	37.0	10.0	12.00
M:75264	20N 26W 34 BD	0.0	200.0	18.00
M:75265	20N 26W 34 BDDC	15.0	1.0	10.00
M:75266	20N 26W 34 C	42.0	30.0	6.00
M:75267	20N 26W 34 CA	21.0	50.0	9.00
75268	20N 26W 34 CA	39.0	90.0	12.00
M:75269	20N 26W 34 CAC	16.0	30.0	2.00
M:75270	20N 26W 34 CAD	31.0	50.0	8.00
M:75271	20N 26W 34 CBA	0.0	500.0	2.00
M:75272	20N 26W 34 CBAB	17.0	250.0	15.00

Montana Bureau of Mines and Geology
Water Well Log Data

11/01/1993

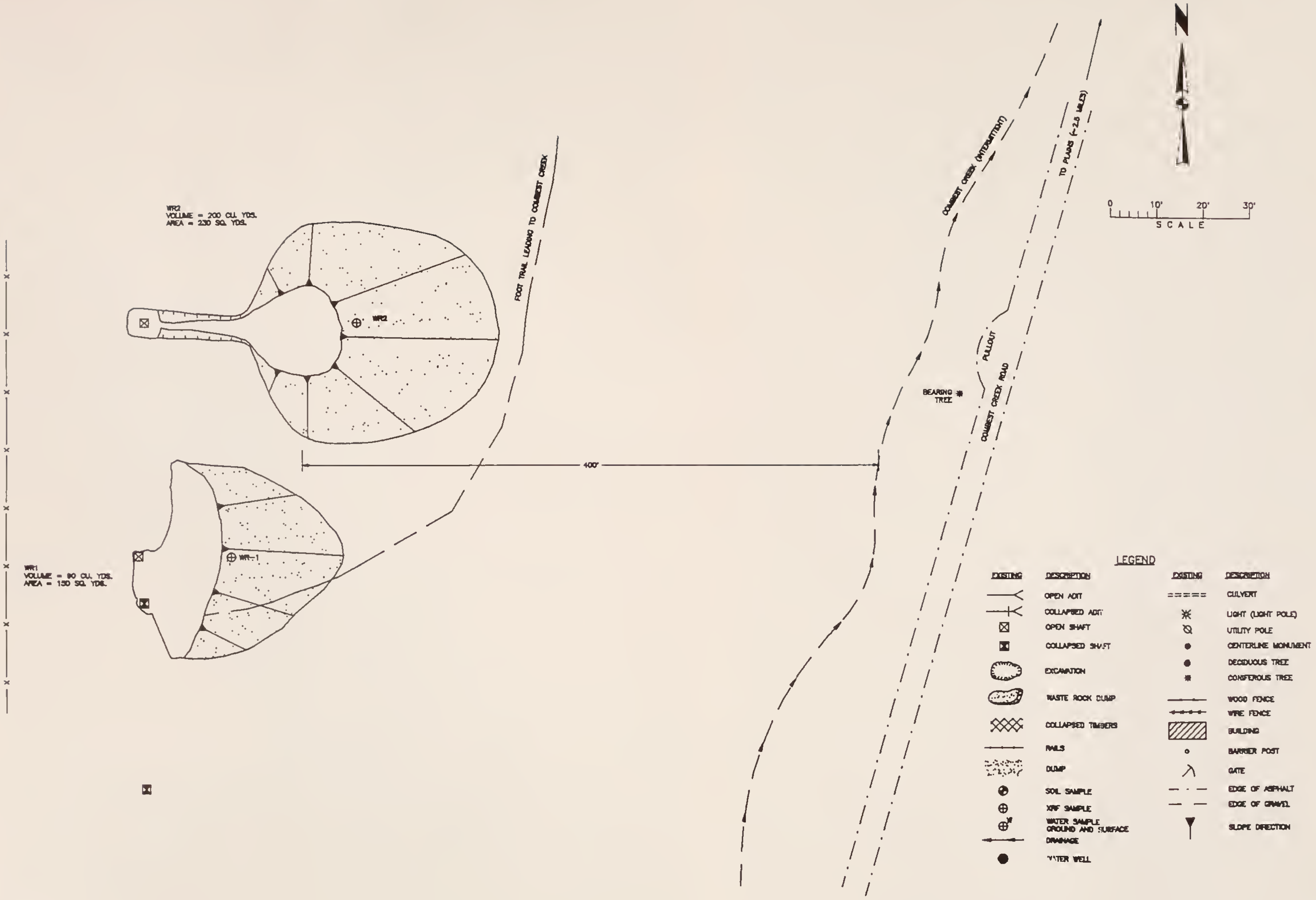
Well No.	Location	Depth	Yield	Static Water Level
M:75277	20N 26W 34 DBBB	22.0	40.0	20.00
M:75276	20N 26W 34 DBBB	20.0	75.0	12.00
M:75278	20N 26W 34 DCC	15.0	1.0	8.00
M:75279	20N 26W 34 DCCC	12.0	1.0	8.00
M:75280	20N 26W 34 DDD	17.0	0.0	8.00
M:75281	20N 26W 35 AB	98.0	50.0	68.00
M:75282	20N 26W 35 ABC	80.0	20.0	40.00
M:75283	20N 26W 35 ACC	80.0	10.0	60.00
M:75284	20N 26W 35 ACCA	35.0	500.0	20.00
M:75285	20N 26W 35 ACCA	48.0	1.0	20.00
M:75286	20N 26W 35 BA	34.0	25.0	23.00
M:75287	20N 26W 35 BCD	12.0	400.0	5.00
M:75288	20N 26W 35 C	40.0	20.0	12.00
M:75289	20N 26W 35 CA	20.0	350.0	13.00
M:75290	20N 26W 35 CBC	21.0	50.0	12.00
M:75291	20N 26W 35 CCC	21.0	60.0	7.00
M:75292	20N 26W 35 CDA	60.0	60.0	12.00
M:75293	20N 26W 35 CDB	42.0	60.0	15.00
M:75294	20N 26W 35 DDC	200.0	30.0	120.00
M:75273	20N 26W 34 CCAD	25.0	20.0	8.00
M:75274	20N 26W 34 CDB	40.0	30.0	7.00
M:75275	20N 26W 34 DBA	20.0	16.0	12.00



PIONEER
TECHNICAL SERVICES, INC.

LOWER LETTERMAN, P.A. NO. 45-047

T19N, R26W, SECTION 03
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
—<	OPEN ADIT	=====	CULVERT
—+<	COLLAPSED ADIT	✳	LIGHT (LIGHT POLE)
☒	OPEN SHAFT	⌀	UTILITY POLE
■	COLLAPSED SHAFT	●	CENTERLINE MONUMENT
	EXCAVATION	●	DECIDUOUS TREE
	WASTE ROCK DUMP	✱	CONIFEROUS TREE
⨳	COLLAPSED TIMBERS	—·—	WOOD FENCE
—+—	RAILS	—•—•—	WIRE FENCE
⁘	DUMP	▨	BUILDING
◒	SOIL SAMPLE	○	BARRIER POST
⊕	XRF SAMPLE	⋏	GATE
⊕	WATER SAMPLE GROUND AND SURFACE	— · —	EDGE OF ASPHALT
←—	DRAINAGE	— —	EDGE OF GRAVEL
●	WATER WELL	▼	SLOPE DIRECTION

DRAWN MEE DATE 10/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LOWER LETTERMAN PA# 45–047
PLAINS DISTRICT SANDERS COUNTY

SHEET NO.

45–047.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	90	Waste rock associated with southern stope	None	6.55 (S)	0.035	45-047-WR-1	08/06/93 1500	T-Metals, ABA
WR-2	WR	200	Waste rock associated with northern stope	None	5.64 (S)	0.04			
WR-3	WR	133	Waste rock associated with HMO prospect 1/4 mile north	None	6.41 (S)	0.02	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 45-047-WR-1 is a composite of WR-1 and WR-2.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes X , No____, Number: 1 Identification: Southern stope has water in the bottom-appears to be precipitation.

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 5 miles?: Yes X , No___;
Number of well logs: 344

Distance to nearest well used for drinking? 0.35 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Workings are shallow, water appears to be precipitation. Parameters measured indicate no impact.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	SH	Southern stope	N/A	6.4	90	NM	NM	NM	10' bgs	N/A	N/A	Field Parameters

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):________

Dry streambeds: Yes X , No____, Name(s): Combest Creek is approximately 400 feet below the mine.

Other surface water: Yes____, No X , Name(s)/Description:________

Waste materials within any floodplain: Yes____, No X Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:________, Average Flow:________

Distance between waste source(s) and nearest surface water body (ft)? 400 feet

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:________

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Clark Fork has irrigation, agriculture, T&E - Bald Eagle, and possible residential.

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? N/A

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000_X_; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 0.35 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	1,350	1,080	No	None
WR-2	None	Dry	2,070	1,656	No	None
WR-3	None	Dry	880	440	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____________________

Evidence of recreational use on site: Yes_X_, No___, Describe: There are hiking trails.

Accessibility - Fences, warning signs, closed roads? Unrestricted; walk to site approximately 1/4 mile

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle, Peregrine
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _3_
Sport Fishery Classification - _2_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_3_, types and locations:___ Stopes at Lower Letterman plus one HMO Adit north 1/4 mile

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

Bibliography

MBMG, Mines and Mineral Deposits (Except Fuels), Sanders County, Montana, Bulletin 34, Written by F.A. Crowley, May 1963.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Lower Letterman, Prepared by Northern Engineering and Testing, September 8, 1988.

USGS, Topographic Map, Plains, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

LOWER LETTERMAN
PA NO. 45-047

Lower Letterman PA# 45-047
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/06/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-047-WR-1	4 U	42.4	1.5	9.3	5.9	19.3 J	24800	0.543	2510 J	16	2600	5 UJ	47	NR
BACKGROUND	4.44 U	234	1.06	8.15	7.26	8.33	12900	0.037	987	9.72	21.3	5.79 U	95.2	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
45-047-WR-1	0.01	0.31	8.55	8.24	0.01	<0.01	<0.01	0.00	8.55

LEGEND

WR1 - Composite of subsamples WR1 and 2.
BACKGROUND - From the Montro Gold Mine (45-010-SS-1).

XRF ANALYSIS RESULTS

LOWER LETTERMAN
PA NO. 45-047

Mine Name: Lower Letterman PA# 45-047
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
45-047-WR1-A		16651.7	8147.34	1185.83		4074.57	54372.7		47.7037 *	123.495 *		59.3041
45-047-WR2-A		17564.1	7391.12	1212.25		4878.9	47209.6			109.377 *		93.0851
45-047-WR3-A		4734.94	34259.3	1400.57		3240.71	81413	566.444 *	852.963	185.4		162.229
45-047-WR-1-COMP		16278.6	7792.6	1215.75		4282.32	48261.1			122.578 *		89.2585

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
45-047-WR1-A	208.591			3448.02	113.21			309.964	101.857 *		
45-047-WR2-A	219.162			1570.62	143.98			433.061	126.435 *		13.0464 *
45-047-WR3-A	69.8841				29.4124 *			61.2487 *			
45-047-WR-1-COMP	202.429			2466.89	126.576			366.038			14.5569 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LOWER LETTERMAN
PA NO. 45-047

AIMSS SCORESHEET

SITE NAME: LOWER LETTERMAN
PA NUMBER: 45-047

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.259
6	GW - TARGETS	WELLS - 1 MI. x 2.5		192.5
7		WELLS - 1 TO 4 MI		267
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	464.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	4812

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.286
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		5
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	12
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	137

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.029
29	AIR - TARGETS	POPULATION - 4 MILES		1000
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	1020
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	296

DIRECT CONTACT PATHWAY

36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.026
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	20
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	130

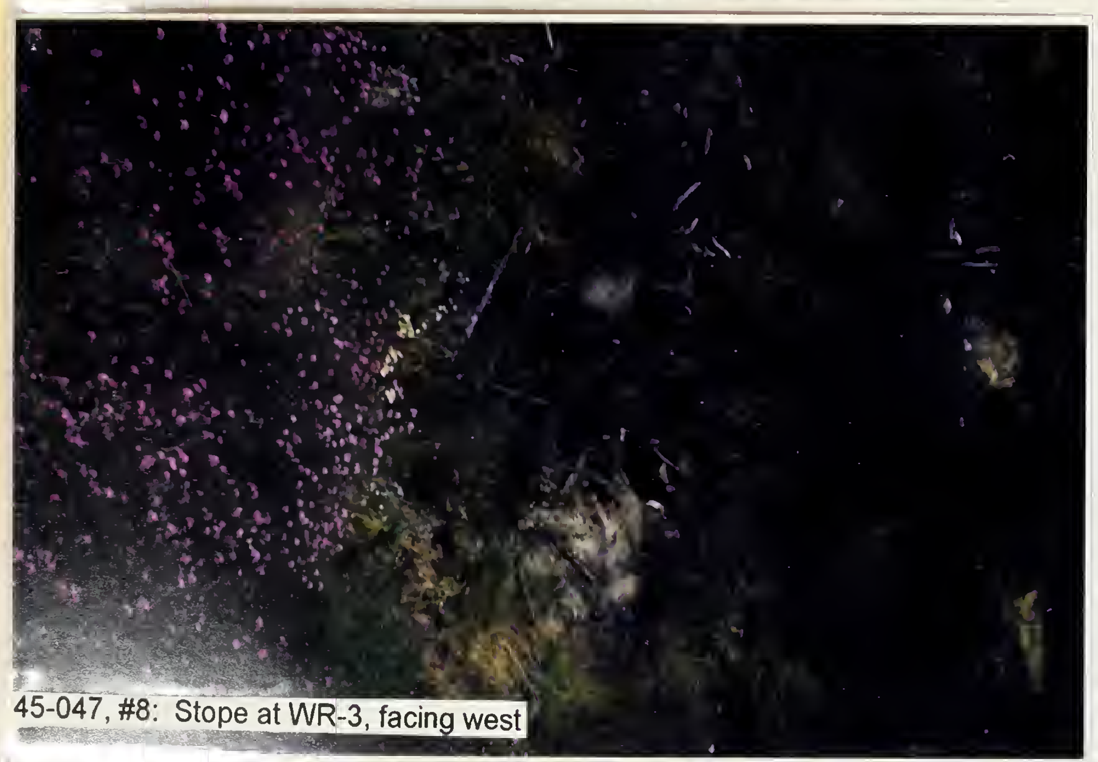
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.05**

SITE NAME: LOWER LETTERMAN
PA NUMBER: 45-047

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	200
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	250
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	20
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	100.00

45-047, #6: WR-3

45-047, #7: Stope opening


45-047, #8: Stope at WR-3, facing west

45-047, #9: Southern stope opening associated with WR-1

45-047, #10: WR-1, facing south

45-047, #11: Northern stope

45-047, #12: WR-2, facing southwest

TROUT CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: HOLLIDAY MINE PA#: 45-009

Date: August 3, 1993 Time: 1700-2100

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear skies; warm.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #22: WR-1; #23: Discharging adit associated with WR-3; #24: WR-3; #25: WR-4. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to site was gained by truck to the Forest Service gate at each access.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Divert discharge from adits associated with WR-1, WR-3, and WR-4 so it is not flowing over dumps. Move WR-4 out of West Fork of Pilgrim Creek. Possibly recontour and revegetate dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): HOLLIDAY MINE PA#: 45-009

Legal Description: T 26N ;R 34W ;Sec. 36 ,SE 1/4NE 1/4 ___1/4

County: SANDERS Mining District: TROUT CREEK

Latitude: N 47° 58' 30" Longitude: W 115° 54' 40"

Primary Drainage Basin and Code: Pilgrim Creek/17010213
Secondary Drainage Basin: West Fork Pilgrim Creek

USGS Quadrangle map name(s): Gem Peak

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Milo McLeod, Lolo National Forest, Building 24, Fort Missoula, Missoula, MT 59801. (406) 329-3853.

Relationship to other mines/sites in the area/district: There are no other mine sites near the Holliday Mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 3400'-3800' , Slope 16°-20° ,
Aspect North

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 1.2-2 acres.
Dimensions:___

Predominant vegetation types: Pine forest with all associated vegetation types.

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Good access, but you need a key to both of the two gates.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There were no well logs with a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on headwaters of perennial West Fork Pilgrim Creek. Quartz material and Belt rocks found in dumps.

Mining/milling history, ore type/tenor, host rock, gangue: There was no available literature of district or particular site. Quartz veins in Belt host.

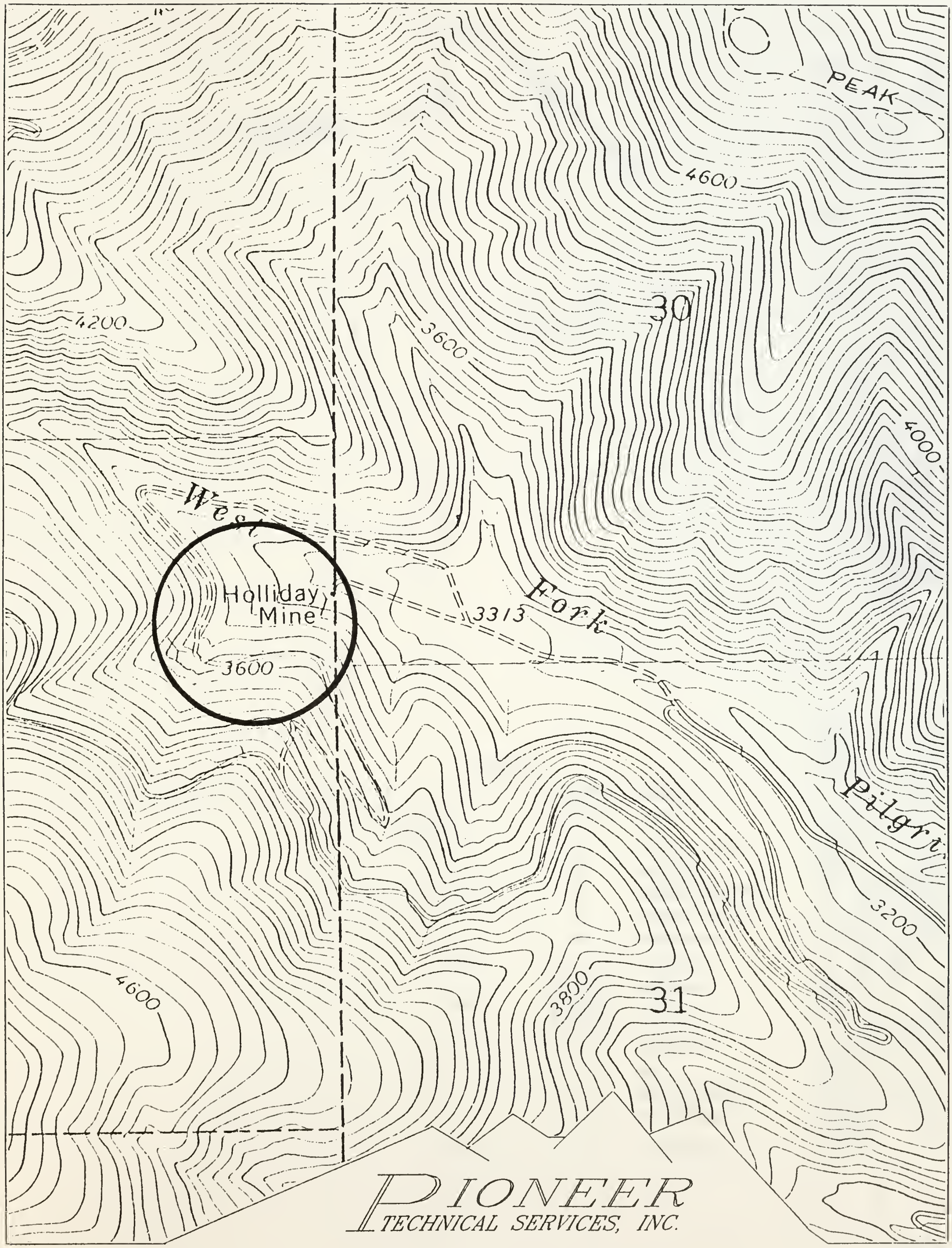
Mine Operation?
Shafts - Yes___, No_X_, # _____, Comment
Adits - Yes_X_, No___, # _4_, Comment 4 caved; 2 with discharge
Pits - Yes___, No_X_, # _____, Comment
Placers - Yes___, No_X_, # _____, Comment
Other - Yes___, No_x_, # _____, Comment

Mill Operation? Yes____, No_X_. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

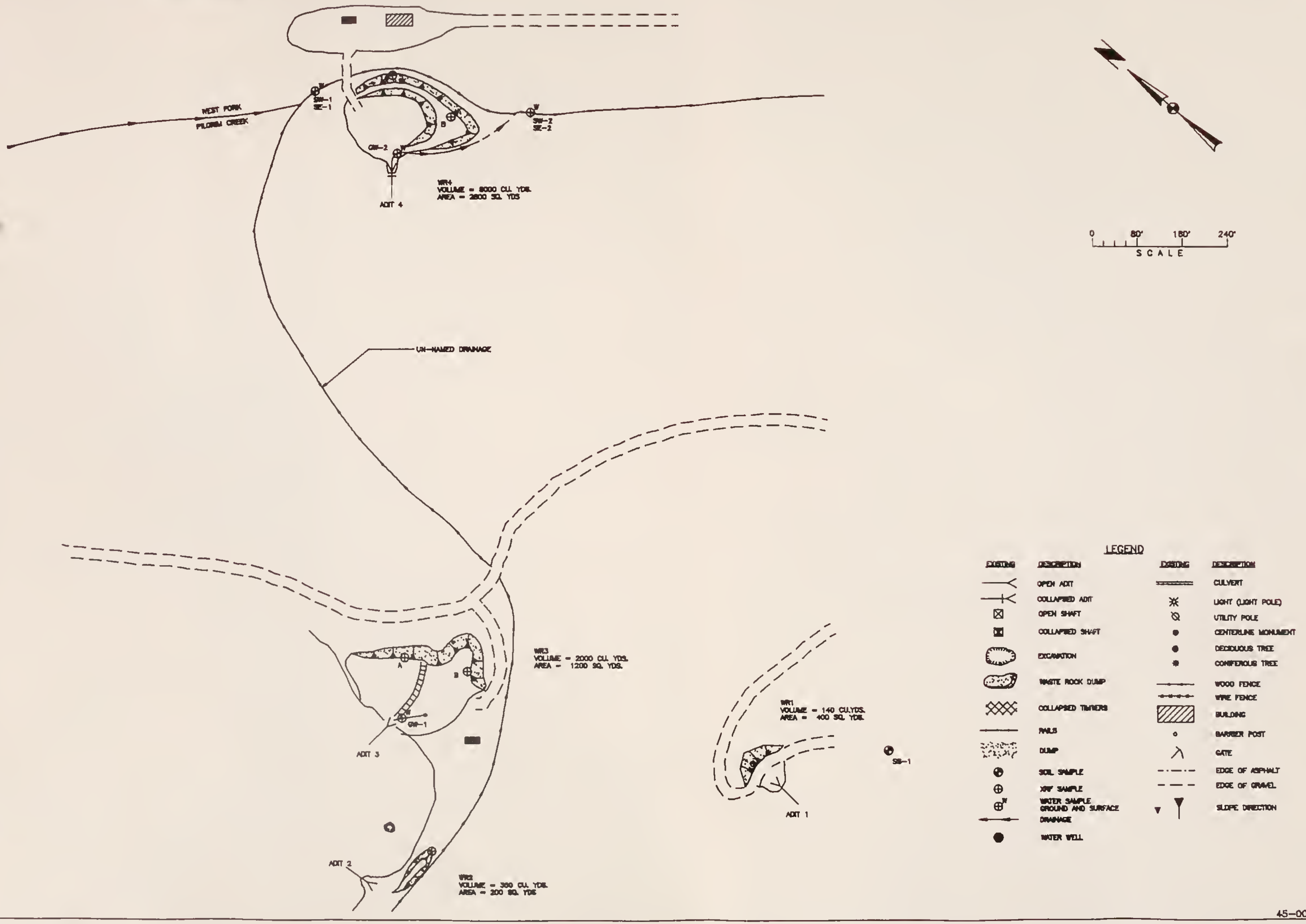
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



HOLIDAY, P.A. NO. 45-009

T26N, R34W, SECTION 36

SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

HOLLIDAY MINE PA# 45-009
TROUT CREEK SANDERS COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN MEE DATE 11/93
DESIGNED TPR JOB NO. 93-17
APPROVED F.B. NO.

TDSH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

45-009.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Belanger, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	140	Near top, center	None	6.8 (D)	0.06	45-009-WR-1	08/04/93 1810	T-Metals, ABA
WR-2	WR	350	Toe of dump, near drainage	None	6.8 (D)	0.05			
WR-3A	WR	2,000	North end, near old cart tracks	None	6.8 (D)	0.04			
WR-3B	WR		South side, near road	None	6.8 (D)	0.03			
WR-4A	WR	8,000	South side where dump is in stream	None	6.8 (D)	0.06			
WR-4B	WR		Northeast side on level above toe.	None	6.8 (D)	0.04			
SS-1	BKGRND	N/A	Background soil east of WR-1	N/A	N/A	N/A	45-009-SS-1	08/04/93 1730	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 45-009-WR-1 is a composite of WR-1, -2, -3A, -3B, -4A, and -4B.

MDSL AMRB/PIONEER 4/9/93

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 3 Identification: Discharge from adits associated with WR-1, WR-3 and WR-4.

Filled shafts: Yes ___, No X , Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X , Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes ___, No X ;
Number of well logs: ___

Distance to nearest well used for drinking? 5 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable ___, Possible ___, Unlikely X .
Low metals values; good water discharge.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Discharge from Adit #3 at WR-3	<1 gpm (E)	7.28	249	201	13.1	148	N/A	45-009-GW-1	08/03/93 1845	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	AD	Discharge from Adit #4 at WR-4	2 gpm (E)	6.57	140	184	10.4	50	N/A	45-009-GW-2	08/03/93 1940	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Adit discharge on Adit #4 from pipe exiting caved adit.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes_X_, No___, Name(s): West Fork Pilgrim Creek

Dry streambeds: Yes____, No_X_, Name(s):

Other surface water: Yes____, No_X_, Name(s)/Description:

Waste materials within any floodplain: Yes_X_, No___ Source ID(s):_

Approximate Flood frequency?_X_1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? 1 during investigation
High Flow: 12 cfs , Average Flow: 1.5 cfs

Distance between waste source(s) and nearest surface water body (ft)?
5 feet; surface water flows by dump, but not on it.

Surface water draining onto or through waste sources: Yes____, No_X_,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetlands, fishery, Noxon drinking water supply

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X_, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient on unnamed drainage in West Fork Pilgrim Creek	6.88	67	185	12.9	17	1.4	45-009-SW-1	08/03/93 1930	T-Metals, TDS, Hardness, Cl, SO4,NO2/NO3
SE-1	SE	Upgradient on unnamed drainage in West Fork Pilgrim Creek	N/A	N/A	N/A	N/A	N/A	N/A	45-009-SE-1	08/03/93 1930	T-Metals
SW-2	SW	Downgradient of mine in West Fork Pilgrim Creek	6.48	68	230	11.9	23	0.9	45-009-SW-2	08/03/93 1830	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Downgradient of mine in West Fork Pilgrim Creek	N/A	N/A	N/A	N/A	N/A	N/A	45-009-SE-2	08/03/93 1830	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? There is a total of 5 acres; 3 around WR-4 and 2 around WR-5.

Wetlands present: Yes_X_, No___, Describe: Numerous wetland areas are located near SW-2 location on unnamed drainage.

Carbonate rocks/soils: Yes_X_, No___, Describe: Belt limestones are on dumps.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Nearest residence(ft or miles)? 5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Wet	3,600	1,800	No	Low
WR-2	SO3	Wet	1,800	450	No	Low
WR-3	SO3	Wet	10,800	8,100	No	Low
WR-4	SO3	Wet	25,200	18,900	No	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes___, No_X_, Describe:______

Accessibility - Fences, warning signs, closed roads? Closed roads at both access points by the Forest Service.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes_X_, No___, Comment Grizzly
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Holliday Mine, Prepared by Northern Engineering and Testing, August 9, 1988.

USGS, Topographic Map, Gem Peak, Montana, 7 1/2 minute Quadrangle, 1966.

LABORATORY ANALYTICAL DATA

HOLLIDAY
PA NO. 45-009

Holliday PA# 45−009
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − TUESDAY
INVESTIGATION DATE: 08/03/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45−009−SE−1	7.52	45.6	0.6 U	7.84	9.96	35.9 J	21000	0.040 J	406	11.5	65 J	7.17 U	96.6	NR
45−009−SE−2	11.3	38.7	0.4 U	6.53	10.5	18.5 J	20900	0.021 J	398	12.6	50.4 J	5.27 U	94.6	NR
45−009−WR−1	12	77.4	0.5 U	9.55	5.86	45.1 J	21300	0.032 J	513	11.1	371 J	6.07 U	125	NR
BACKGROUND	8.68	142	0.6 U	10.4	10.5	21.2 J	22100	0.059 J	710	14.4	33.8 J	6.84 U	78.2	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
45−009−WR−1	0.06	1.87	25.7	23.9	0.01	0.02	0.03	0.62	25.1

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45−009−GW−1	1.69 U	59.2	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.038 U	4.08 U	12.7 U	3.16	30.7 U	69.7	146
45−009−GW−2	2.54	59.7	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.076 J	4.08 U	12.7	2.89	30.7 U	32	42.4
45−009−SW−1	1.54 J	2.5	2.57 U	9.7 U	6.83 U	1.55 U	17.6 J	0.140 JX	4.08 U	12.7 U	2.15 J	30.7 U	10.2 J	12.3
45−009−SW−2	1.74 J	3.07	2.57 U	9.7 U	6.83 U	1.55 U	11.8 U	0.190 JX	4.08 U	12.7 U	1.38 J	30.7 U	7.57 U	13.1

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
45−009−GW−1	150	< 5.0	9	< 0.05	NR
45−009−GW−2	41	< 5.0	< 5.0	< 0.05	NR
45−009−SW−1	< 5.0	< 5.0	< 5.0	< 0.05	NR
45−009−SW−2	31	< 5.0	< 5.0	< 0.05	NR

LEGEND

SE1 − Upgradient on unnamed drainage.
SE2 − Downgradient of mine in W. Fork Pilgrim Creek.
WR1 − Composite of subsamples WR 1, 2, 3A, 3B, 4A, and 4B.
BACKGROUND − From the Holliday Mine (45−009−SS−1).

GW1 − Discharge from adit #3 (caved).
GW2 − Discharge from adit #4 (pipe).
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.

XRF ANALYSIS RESULTS

HOLLIDAY
PA NO. 45-009

Mine Name: Holliday PA# 45-009
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
45-009-WR3-A		27071.6	3083.46	2936.36		597.678 *	22653.9			106.265 *	32.7507 *	56.8074
45-009-WR3-B	274.771 *	21582.3	14348.8	2512.4	140.467 *	716.021 *	22112.3		167.061 *	603.402		63.9562
45-009-WR4-A		26018.1	2128.33	2886.27	158.318 *	633.176 *	33376.9			64.9272 *	32.4256 *	48.3335
45-009-WR4-B		29198.5	5880.2	3685.23			19387.3		48.1959 *	83.7866 *	31.5958 *	78.7157
45-009-WR-1		19859.4	4172.23	2747.19		1149.54 *	28222.3	320.578 *	92.5751 *	131.966 *		81.5057
45-009-WR-1	703.794		59.2887		64.0249		-8.82515	-54.768	60.4733	8.54626	-59.1431	-7.23204
45-009-WR-1-COMP		18091.9	5142.56	2230.67	191.881 *	327.713 *	9871.38			124.008		14.4731 *
45-009-WR-2		15620	11061.3	3218.52		2357.22	34047			190.114		107.528

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
45-009-WR3-A	330.276				144.539			499.987		13.0945 *	14.7188 *
45-009-WR3-B	275.071			803.445	135.088			541.45	74.1219 *		17.2205 *
45-009-WR4-A	365.546				183.228			495.01		14.4526 *	15.679 *
45-009-WR4-B	362.631				154.288			547.762			14.309 *
45-009-WR-1	323.836			866.491	144.492			464.569		13.4636 *	21.8295 *
45-009-WR-1	5.66989	5.899	-1.65303	15.2829	-0.80321	-0.38884	10.3491	0.746052	-6.82515	-3.33732	2.36771
45-009-WR-1-COMP	247.82			80.0033	99.7281			183.606		10.7837 *	21.7874
45-009-WR-2	313.175				141.914			569.485		11.7779 *	16.1293 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

HOLLIDAY
PA NO. 45-009

AIMSS SCORESHEET

SITE NAME: HOLLIDAY MINE
PA NUMBER: 45-009

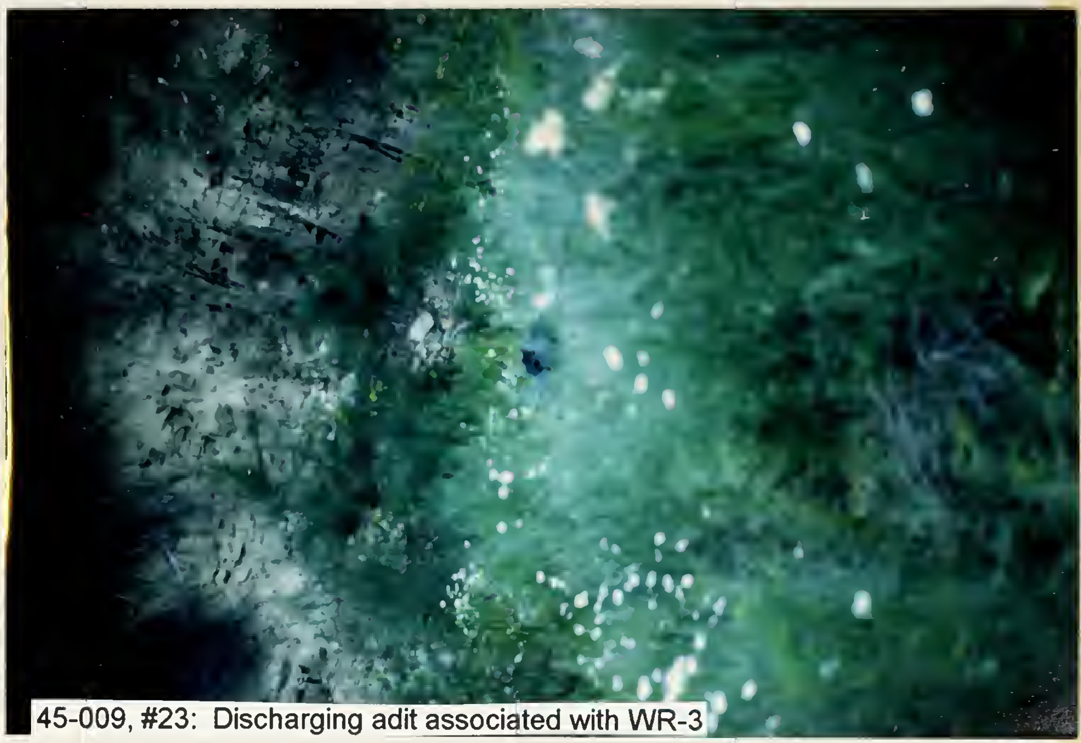
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.523
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.863
16	SW - TARGETS	DRINKING WATER POP'N		10
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	26
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	40175
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.038
29	AIR - TARGETS	POPULATION - 4 MILES		0
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	15
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	29
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.034
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.40**

SITE NAME: HOLLIDAY MINE
PA NUMBER: 45-009

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

45-009, #22: WR-1


45-009, #23: Discharging adit associated with WR-3

45-009, #24: WR-3

45-009, #25: WR-4

WHITE PINE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: JACK WAITE PA#: 45-002

Date: September 7, 1993 Time: 1015-1200

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Tim Pfahler, MDSL Helicopter Pilot
Unidentified camper and family

Weather/Seasonality Observations: Warm; calm; clear; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #30-#32: WR-1; #33: GW-1 sample location. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Claim may be logged in the near future. Majority of disturbance associated with this mine is located across the state line in Idaho.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Establish a drainage isolated from the waste rock material. Grade, amend, and revegetate waste material. Study need for treatment of adit discharge.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): JACK WAITE PA#: 45-002

Legal Description: T 22N ;R 32W ;Sec. 17 , NE1/4 SW1/4 ___1/4

County: SANDERS Mining District: WHITE PINE

Latitude: N 47° 39' 50" Longitude: W 115° 43' 15"

Primary Drainage Basin and Code: Beaver Creek/17010213
Secondary Drainage Basin: Dixie Creek

USGS Quadrangle map name(s): Cooper Gulch

Mine Type/Commodities: Hardrock/Gold, Silver, Copper, Lead, Zinc

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Jack Waite, 1139 Riverdale Avenue, Calgary, Alberta, Canada T2S049; Kootenai National Forest.

Relationship to other mines/sites in the area/district: Related to the Jack Waite located west, across the Idaho border, from this site.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 4800', Slope 5°-35°,
Aspect Eastern

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify) Timber harvesting

Area of disturbed/unvegetated lands? 0.5 acres.
Dimensions: Site dimensions are approx. 120 feet x 170 feet.

Predominant vegetation types: White pine, larch, hemlock, pine grass, Douglas fir, cottonwood

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is located near the headwaters of Dixie Creek, a major tributary to Beaver Creek. Dixie Creek flows into Beaver Creek approx. 1 mile east-southeast of the site.

Mining/milling history, ore type/tenor, host rock, gangue: Ore minerals include galena, sphalerite, chalcopyrite, pyrite and tetrahedrite. Gangue minerals are primarily siliceous.

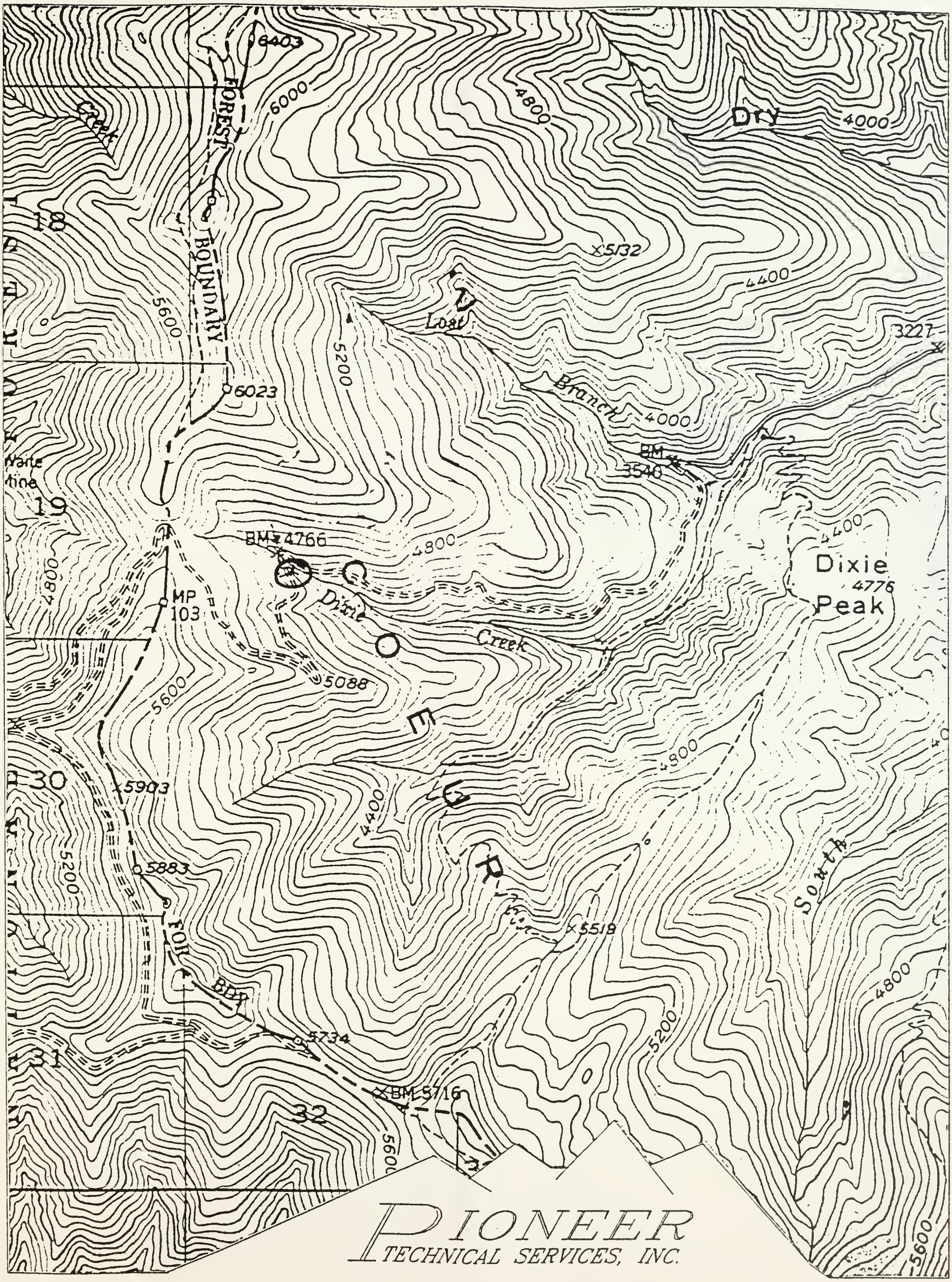
Mine Operation?
Shafts - Yes___, No X, # ___, Comment___
Adits - Yes X, No___, # 1, Comment Very deep
Pits - Yes___, No X, # ___, Comment___
Placers - Yes___, No X, # ___, Comment___
Other - Yes___, No X, # ___, Comment___

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

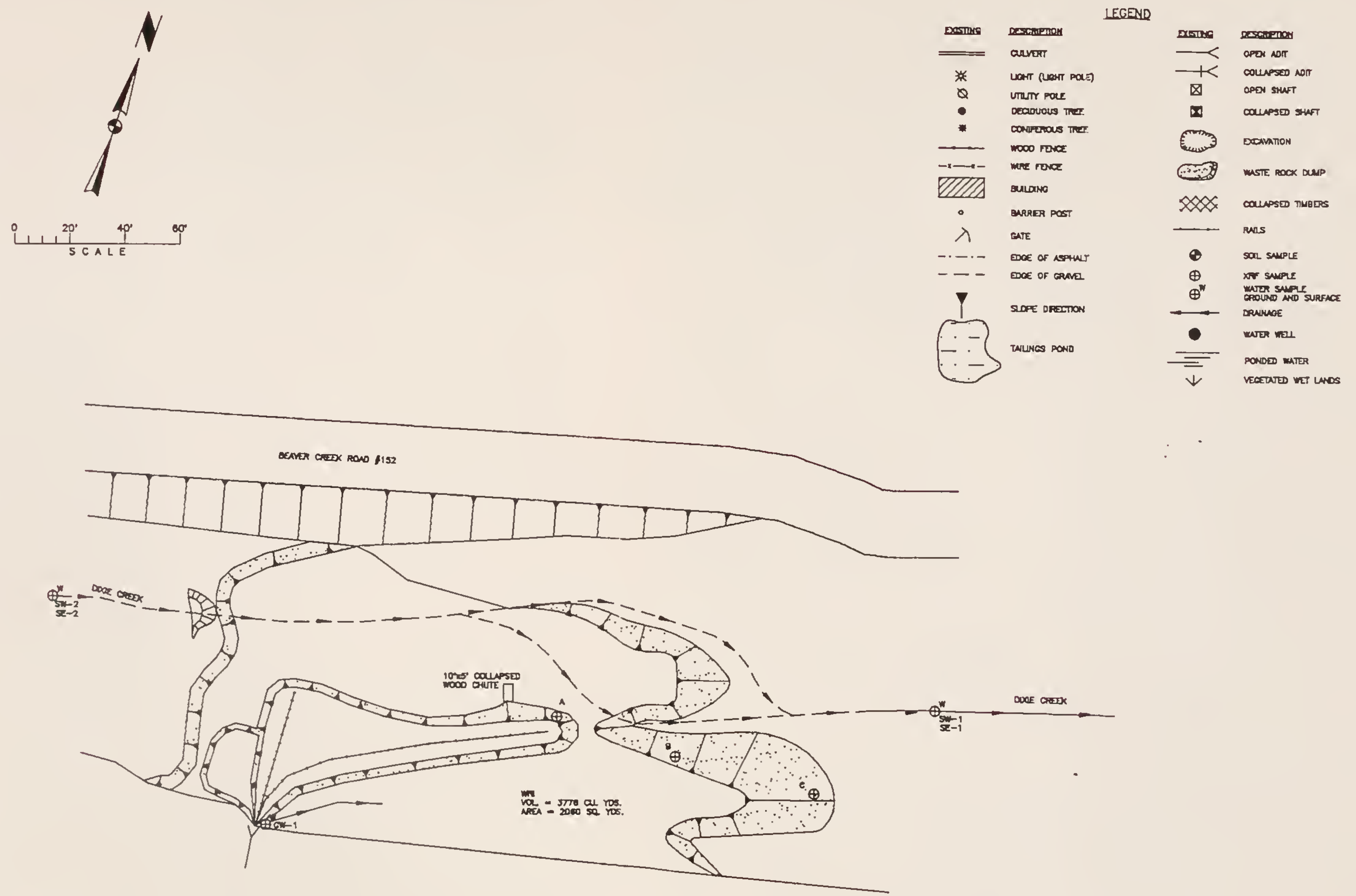
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

JACK WAITE, P.A. NO. 45-002

T22N, R32W, SECTION 17
SCALE: 1" = 1000'



DRAWN TWC DATE 17 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

JACK WAITE PA# 45-002
WHITE PINE DISTRICT SANDERS COUNTY

SHEET NO.

SHEETS

45-002.DWG

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	3,800	Northern finger of dump; light gray/tan	None	7.0 (D)	0.03	45-002-WR-1	09/07/93 1800	T-Metals, ABA
WR-1B	WR		Western portion of southern finger; dark gray/black	None	7.0 (D)	0.05			
WR-1C	WR		Eastern portion of southern finger	None	7.1 (D)	0.05			

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 45-002-WR-1 is composite of WR-1A, -1B, and -1C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_1_ Identification:_Adit #1_

Filled shafts: Yes___, No_X_, Number:___ Identification:___

Seeps/Springs: Yes___, No_X_, Number:___ Identification:___

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_1_

Distance to nearest well used for drinking?_> 4 miles according to the topographic map_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite___, Probable___, Possible_X_, Unlikely___.
Due to groundwater flowing through open mineralized adit and dump material with elevated metal values.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC μS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit discharge	3 gpm (E)	7.4	280	170	NM	78	N/A	45-002-GW-1	09/07/93 1145	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Dixie Creek

Dry streambeds: Yes ___, No X , Name(s): ___

Other surface water: Yes ___, No X , Name(s)/Description: ___

Waste materials within any floodplain: Yes X , No ___ Source ID(s): WR-1

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? ___
High Flow: 1.5-3 cfs , Average Flow: 10-20 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ___,
Describe: Stream flows through the WR-1 (subsurface).

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetlands, stock watering, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No ___, Distance downstream (ft)? 100' Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Minimal erosion of dump material into stream channel.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	200 feet downstream of WR-1	7.28	155	207	NM	39	10 gpm (E)	45-002-SW-1	09/07/93 1110	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	200 feet downstream of WR-1	N/A	N/A	N/A	N/A	N/A	N/A	45-002-SE-1	09/07/93 1110	T-Metals
SW-2	SW	100 feet upstream from WR-1	7.98	110	198	NM	24	7 gpm (E)	45-002-SW-2	09/07/93 1130	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	100 feet upstream from WR-1	N/A	N/A	N/A	N/A	N/A	N/A	45-002-SE-2	09/07/93 1130	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
$pH \leq 5.0$	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None; steep gradient stream for approx. 3 miles below the mine

Wetlands present: Yes___, No X, Describe:___

Carbonate rocks/soils: Yes X, No___, Describe: Carbonate soils were observed.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Nearest residence(ft or miles)? Approx. 10 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	Minor SO3	Dry	18,540	18,540	No	None

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No__X__,
Describe:________________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes_X_, No____, Describe: A logger and family visited the site while investigation occurred.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes_X_, No___, Comment Grizzly
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:
Adit

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations: WR-1 is oversteepened and located in drainage.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Jack Waite, Prepared by Northern Engineering and Testing, August 18, 1988.

USGS, Topographic Map, Cooper Gulch, Montana, 15 minute Quadrangle, 1952.

LABORATORY ANALYTICAL DATA

JACK WAITE
PA NO. 45-002

Jack Waite PA# 45-002
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 09/07/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
45-002-SE-1	9.91 J	69.2	1	9.06	1.53 U	36.6	16600	0.034 U	274	18	866	6.89 UJ	178 J	NR
45-002-SE-2	21 J	68.3	0.8 U	16.2	5.91	20.1	21200	0.043 U	965	16.9	68.7	9.9 UJ	102 J	NR
45-002-WR-1	25.1 J	56.7	513	9.47	1.7	97.2	22300	0.028 U	374	11.4	4150	11.9 J	7920 J	NR
BACKGROUND	8.68	142	0.6 U	10.4	10.5	21.2 J	22100	0.059 J	710	14.4	33.8 J	6.84 U	78.2	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
45-002-WR-1	0.53	16.6	21.2	4.68	0.01	0.34	0.18	10.6	10.6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
45-002-GW-1	5.83	16.2	2.57 U	9.7 U	6.83 U	4.07 J	160	0.12 UJX	25.2	12.7 UX	11.5	30.7 U	18.9 J	122
45-002-SW-1	2.38	11.1	2.63 J	9.7 U	7.67	7.5 J	81.3	0.12 UJX	4.08 U	12.7 UX	76.9	30.7 U	82.7 J	62.9
45-002-SW-2	1.69 U	4.07	3.03 J	9.7 U	6.83 U	5.17 J	75.3	0.12 UJX	4.08 U	16.3 JX	4.41	30.7 U	12.4 J	22.3

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
45-002-GW-1	225	< 5.0	42	< 0.05	NR
45-002-SW-1	162	< 5.0	25	< 0.05	NR
45-002-SW-2	90	< 5.0	8	< 0.05	NR

LEGEND

SE1 – 200 feet downstream of waste rock dump 1.
SE2 – 100 feet upstream from waste rock dump 1.
WR1 – Composite of subsamples WR1A, 1B, and 1C.
BACKGROUND – From the Holliday Mine (45-009-SS-1).

GW1 – Adit discharge.
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

JACK WAITE
PA NO. 45-002

Mine Name: Jack Waite PA# 45-002
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
45-002-WR1-A	288.29 *	30077.3	2725.05	1661.05		677.202 *	29171		172.57 *	2879.09		94.5809
45-002-WR1-B		36319.3	2529.72	1680.51	225.258 *	428.656 *	27984.3		183.838	1232.23		112.754
45-002-WR1-C	446.31 *	34328.1	2684.02	1489.23		458.813 *	25857.3	317.802 *	136.296 *	754.149		190.842
45-002-WR-1-COMP	330.55 *	28079.3	2510.81	1508.51		547.961 *	26201		149.754 *	1433.51		111.558

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
45-002-WR1-A	228.158		7.09263 *	4313.18	237.766			498.56			30.9745 *
45-002-WR1-B	242.697			3380.35	278.97			436.936		20.1964 *	25.1567 *
45-002-WR1-C	206.72			3548.93	249.145			446.754	93.963 *		27.1749 *
45-002-WR-1-COMP	208.362		5.51637 *	3444.42	240.244			464.576			31.8672 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

JACK WAITE
PA NO. 45-002

AIMSS SCORESHEET

SITE NAME: JACK WAITE
PA NUMBER: 45-002

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	14.174
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		1
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	1.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	5670
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	15.589
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	21
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	261895
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.513
29	AIR - TARGETS	POPULATION - 4 MILES		0
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	15
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	38
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.466
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	140
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**2.68**

SITE NAME: JACK WAITE
PA NUMBER: 45-002

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**2.00**

45-002, #30: WR-1

45-002, #31: WR-1

45-002, #32: WR-1

45-002, #33: GW-1 sample location

SILVER BOW

BASIN CREEK

BASIN CREEK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: HIGHLAND PA#: 47-028

Date: September 17, 1993 Time: 0930-1500

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Clear; calm; cool; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #21: Adit discharge; #22: WR-1, looking southwest; #23: WR-1, looking northeast; #25: White unknown material. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: Unknown white powder, possibly CaCl or CaCO3.

General Comments on Potential Remedial Alternatives: Grade, amend, and revegetate dump materials.

MDSL AMRB/PIONEER 4/9/93

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): HIGHLAND PA#: 47-028

Legal Description: T 1N ;R 7W ;Sec. 31 , NW1/4 NE1/4 ___1/4

County: SILVERBOW Mining District: BASIN CREEK

Latitude: N 45° 47' 50" Longitude: W 112° 31' 10"

Primary Drainage Basin and Code: Silverbow Creek/17010201
Secondary Drainage Basin: Basin Creek

USGS Quadrangle map name(s): Mount Humbug

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Butte Highland Mining Co., c/o P.A. Hatfield, P.O. Box 323, Veradale, WA 99037. (509) 922-5958; Deerlodge National Forest, P.O. Box 400, 400 North Main, Butte, MT 59703.

Relationship to other mines/sites in the area/district: Ore from the mine was milled at the Middle Fork Millsite approx. 1.5 miles southwest of the mine.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 7280' , Slope 10°-15° ,
Aspect Western

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 1 acres.
Dimensions: Approx. 225 feet x 125 feet

Predominant vegetation types: Douglas fir, spruce, Lodgepole pine, willow, grasses, sage brush

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The mine is located near the headwaters of Basin Creek. Basin Creek flows west and north away from the site. The dolomite is part of the Gallatin Formation and may also be part of the Hasmark Formation.

Mining/milling history, ore type/tenor, host rock, gangue: The mine claims were established prior to 1867, comprising of three very old properties known as the Only Chance, Murphy and J.B. Thompson mines. The ore was primarily a gray quartz breccia occurring in the Meagher Dolomite. Ore was initially milled in arrastres cloys Fish Creek. A 100-ton cyanidation mill was built at the head of Basin Creek in 1932 and then quickly moved to the head of Moose Creek (Middle Fork Millsite, PA# 47-081) due to water quality concerns. Gangue is quartz carrying auriferous pyrite/gold which follows fault and bedding planes and averaged about 0.6 oz/ton.

Mine Operation?
Shafts - Yes ___, No X, # ___, Comment
Adits - Yes X, No ___, # 1, Comment Collapsed
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes X, No ___, # Many, Comment Prospect pits and adits in the area

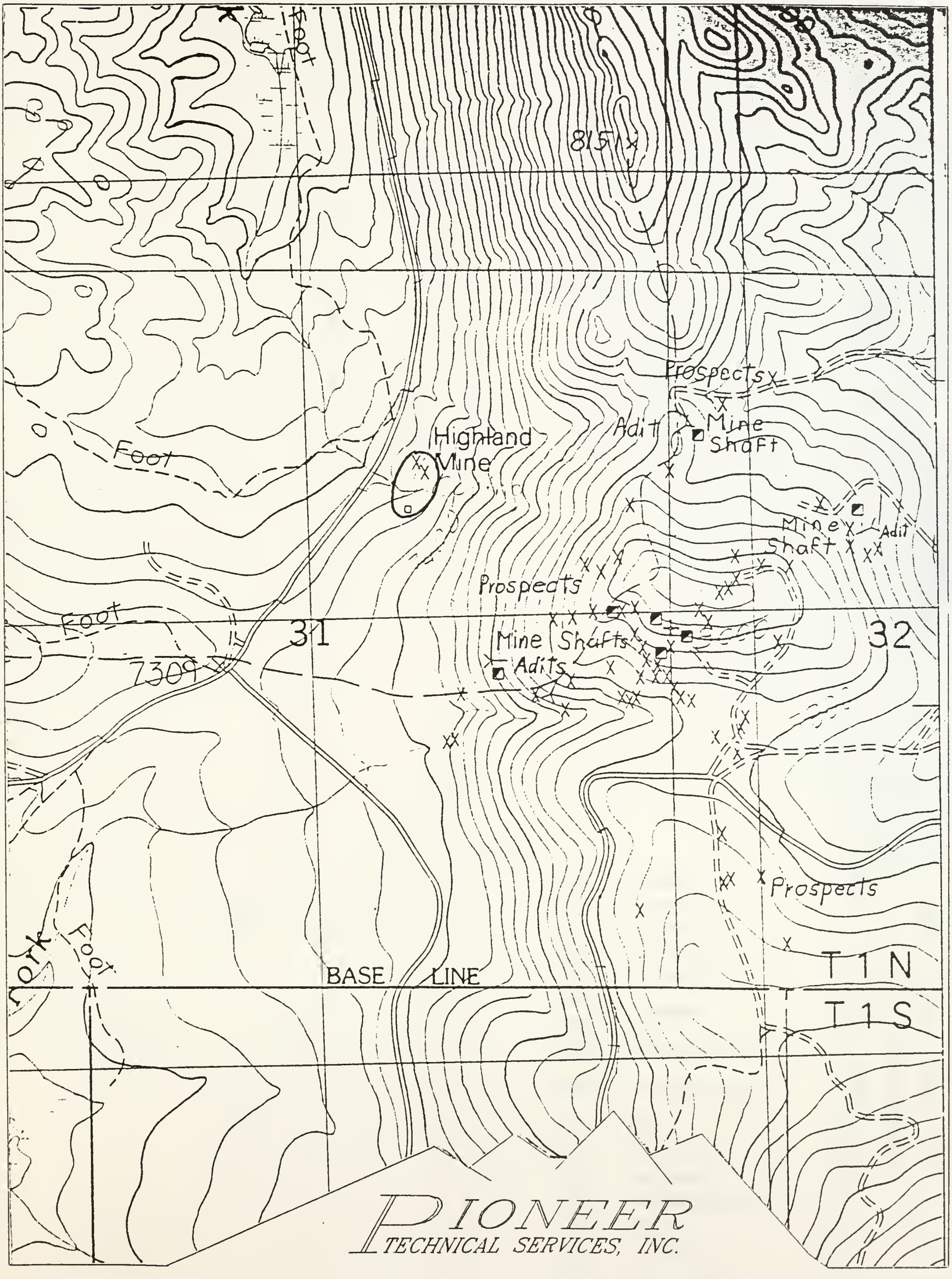
Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

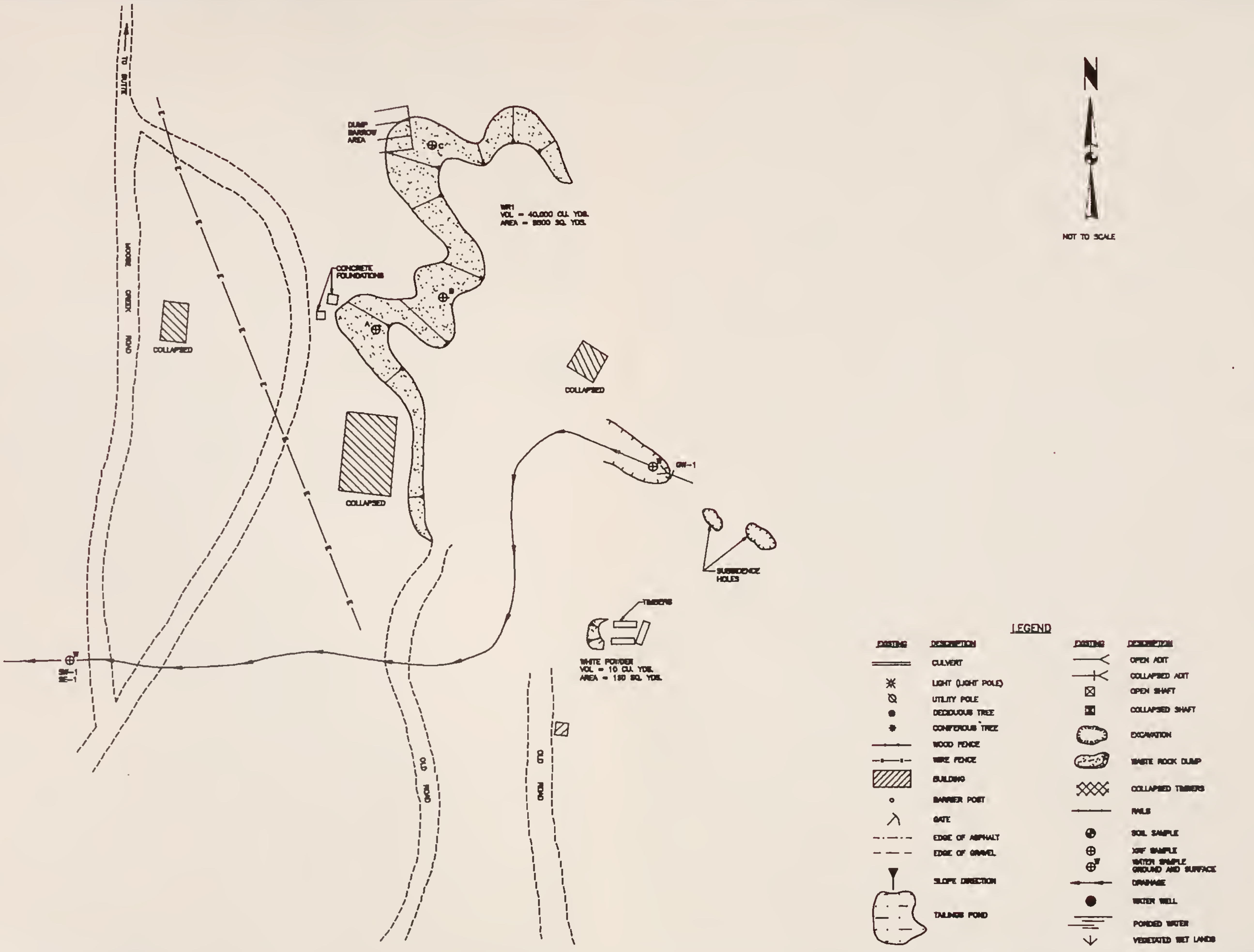
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

No.	Location	Depth	Yield	Static Water Level
07	01N 07W 30 CDDD	0.0	0.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

HIGHLAND, P.A. NO. 47-028
T01N, R07W, SECTION 31



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

HIGHLAND MINE PA# 47-028
BASIN CREEK SILVER BOW COUNTY

PIONEER

DRAWN CAJ DATE 11/22/93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

47-028.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	40,000	North end of dump; iron/orange sand	None	< 3.5 (D)	0.025	47-028-WR-1	09/17/93 1330	T-Metals, ABA
WR-1B	WR		Center of dump; orange sand	None	6.0 (D)	0.03			
WR-1C	WR		South end of dump; orange sand	None	6.5 (D)	0.025			
WR-1D	OTH	10	Unknown pile of white powder, south of dump	None	> 8.0 (D)	0.03			
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	47-028-SS-1	09/17/93 1200	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 47-028-WR-1 is composite of WR-1A through -1C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_1__ Identification:_GW-1_______

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_31___

Distance to nearest well used for drinking?_One well log within 1 mile may be mining exploration related; nearest residence is approx. 2.5 miles from the site._

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Adit discharge has a slightly elevated specific conductance.

Other observations/notes:_Adit discharge drains into the Basin Creek Reservoir (part of Butte's drinking water supply)._

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit #1 discharge	15 gpm (E)	7.42	208	NM	NM	189	N/A	47-028-GW-1	09/17/93 1145	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not measured due to meter malfunction.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes X , No____, Name(s)/Description: Adit discharge flows perennially down to Basin Creek.

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-1 is in contact with adit discharge.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 25 gpm , Average Flow: 15 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Adit discharge

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Drinking water supply for Butte; wetlands; agriculture; irrigation; residential; T&E, Western Cutthroat Trout (sensitive species).

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Adit discharge below Moose Creek Road	7.98	368	NM	NM	188	15 gpm (E)	47-028-SW-1	09/17/93 1130	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Adit discharge below Moose Creek Road	N/A	N/A	N/A	N/A	N/A	N/A	47-028-SE-1	09/17/93 1130	T-Metals
SW-2	BLNK	QA/QC Blank	N/A	N/A	N/A	N/A	N/A	N/A	47-028-SW-2	09/17/93 1230	T-Metals, CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not measured due to meter malfunction.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO$_3$)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Less than 1/2 acre of level ground in the mine area.

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 2.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3; pH	Dry	76,500	68,850	Yes	Low
GW-1	None	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes X , No___, Describe: Litter; campfire rings

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes___, No X , Comment________
Bat Habitat - Yes___, No X , Comment________

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:___

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes X , No____, Number 1 , types and locations: WR-1 has a steep dump face.

Fire and/or Explosion hazards: Yes___, No X , Explain:________

Bibliography

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MBMG, Highland Placer, Form 39, 1982-1986.

MBMG, Mineral and Industry File 90.0, Butte Highland Mine, Silverbow County, Montana.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Highland Mine, Prepared by Northern Engineering and Testing, May 16, 1988.

MDSL/AMRB Files, Letter to The Stockholders of the Butte Highlands Mining Company, Correspondence from the Butte Highlands Mining Company, November 7, 1933.

USGS, Topographic Map, Mount Humbug, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

HIGHLAND
PA NO. 47-028

Highland PA# 47–028
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 09/17/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47–028–SE–1	26.5 J	32.3 J	1.1 U	4.05	3.61 J	38.9	9700 JX	0.037 J	289	71.9	42.9	7.68 UJ	305 J	NR
47–028–WR–1	139 J	38.7 J	1.9 J	9.77	1.81 J	943	128000 JX	0.261 J	491	7.57	13.5	7.09 UJ	79.4 J	NR
BACKGROUND	40.1 J	173 J	1.1 U	10.1	21.1 J	34.3	18500 JX	0.039 J	832	18.1	14.8	7.28 UJ	61.9 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
47–028–WR–1	1.64	51.2	321	270	<0.01	2	0.85	62.5	259

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47–028–GW–1	1.88	12.4	4.59 U	5 U	6.24 U	2.33 U	116	0.12 U	10	10.9 U	1.12	31.7 U	8.71 U	211
47–028–SW–1	1.63	13	4.59 U	5 U	6.24 U	2.33 U	107	0.35	6.3	10.9 U	1.19	31.7 U	8.71 U	206
47–028–SW–2	1.12 U	1.1 U	4.59 U	5 U	6.24 U	2.33 U	13.7 U	0.12 U	3.76 U	10.9 U	0.94 U	31.7 U	8.71 U	0.1

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
47–028–GW–1	178	< 5	15	0.18	NR
47–028–SW–1	210	< 5	16	0.15	NR
47–028–SW–2	NR	NR	NR	NR	< 0.00

LEGEND

SE1 – At adit discharge below Moose Creek road.
WR1 – Composite of subsamples WR1A, 1B, and 1C.
BACKGROUND – From the Highland Mine (47–028–SS–1).
GW1 – Adit #1 discharge.
SW1 – Adit discharge below Moose Creek road.
SW2 – QA/QC Blank.

XRF ANALYSIS RESULTS

HIGHLAND
PA NO. 47-028

Mine Name: Highland PA# 47-028
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
47-028-SS-1		4634.02	66073	1280.28	177.883 *	746.25 *	19727			59.2472 *	37.5645 *	227.238
47-028-WR1-A		1455.23	19784.9	432.972			254389		674.016	180.035		
47-028-WR1-B		8944.33	29702.5	1003.33	170.609 *	488.485 *	102862		527.004	104.577 *	146.344	18.0303 *
47-028-WR1-C		3906.95	134597	987.493	237.099 *	1655.77	63631.8		610.258	111.124 *	133.535	78.7504
47-028-WR1-D			288545		247.49 *					44.0273 *		144.702
47-028-WR-1-COMP		3145.07	59713.2	686.165	235.223 *	676.406 *	155784		709.744	73.6721 *	187.255	31.6165 *

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
47-028-SS-1	67.0732			18.6725 *	54.8106			285.572			6.39458 *
47-028-WR1-A	27.0907										
47-028-WR1-B	32.5406				79.434			36.8078 *			
47-028-WR1-C	44.1648				13.7558 *			34.8421 *			
47-028-WR1-D	4.85461 *										
47-028-WR-1-COMP	36.7271				19.9627 *				143.639 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

HIGHLAND
PA NO. 47-028

AIMSS SCORESHEET

SITE NAME: HIGHLAND
PA NUMBER: 47-028

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.599
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		30
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	32.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	46787
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	7.169
16	SW - TARGETS	DRINKING WATER POP'N		3374
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	3392
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	9726899
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.022
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	33
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.010
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	5
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	8
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			97.74

			SITE NAME:	HIGHLAND
LINE NO.		**SITE SAFETY**	PA NUMBER:	47-028
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	100
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**10.00**

47-028, #21: Adit discharge

47-028, #22: WR-1, facing southwest

47-028, #23: WR-1, facing northeast

47-028, #25: White unknown material

MELROSE

ELK PARK

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MARY EMMEE/CLINTON **PA#:** 47-035

Date: August 20, 1993 **Time:** 1600

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Cloudy; breezy (10 mph); warm (75°F); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #13: Looking down at Shaft #3 (HMO); #14: WR-4 in foreground, WR-3 in background, looking east; #15: Adit #1, with pond receiving discharge in front; #16: WR-1 associated with Adit #1, looking east, water from discharge runs down waste rock pile on south side.
Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms):

Site is divided into two areas. Located off of KXLF Road at about 7400 feet is WR-2, -3, -4 and Shaft #3 and #4. The other area is located just off Interstate 15 approx. 1/2 mile below the upper area. It is composed of Adit #1, WR-1, and Shaft #1 and the elevation of this lower area is approx. 6200 feet.

It appears that a small amount (20 yd3) of tailings or sand have been moved in to form berms for small retaining pond for Adit #1 discharge. Some water enters the pond, but most of the water flows on either side of the pond.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: In the upper area, fill shafts with waste rock and contour the remaining waste rock; lime, topsoil, fertilize, and reseed the area. At the lower area of the site, route adit discharge around waste rock and create a wetlands discharge area. Recontour, lime, topsoil, and vegetate the waste rock area.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MARY EMMEE/CLINTON **PA#:** 47-035

Legal Description: T 3N ;R 7W ;Sec. 10 , NE1/4 SW1/4 ___1/4

County: SILVER BOW **Mining District:** ELK PARK-BUTTE

Latitude: N 46° 01' 17" **Longitude:** W 112° 27' 14"

Primary Drainage Basin and Code: Silver Bow Creek/17010201
Secondary Drainage Basin: Woodville Gulch

USGS Quadrangle map name(s): Elk Park Pass

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Inland Properties, Inc., P.O. Box 8182, Missoula, MT 59807.

Relationship to other mines/sites in the area/district: Numerous mines are in the same area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation Upper, 7200'; lower, 6200', **Slope** Upper, 22°; lower, 12°-20° , **Aspect** Upper, southeast; lower southwest

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 3 acres.
Dimensions: Upper site dimensions are 200 feet x 200 feet; lower site dimensions are 600 feet x 200 feet.

Predominant vegetation types: Lodgepole pine and aspen with sparse grasses and perennials; brushes and creeping juniper

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Key is needed for KXLF Road for upper area; pull off I-15 for lower.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 12 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by quartz monzonite of the Boulder Batholith. Area is approx. 1/2 mile north of the East Pit of the Berkley Pit. Water from the lower site drains into an unnamed tributary which flows under the interstate almost immediately after confluence through a 36" culvert. Water from there appears to flow into the Berkley Pit area.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?
Shafts - Yes X , No___, # 3 , Comment 18, 40, and 30 feet deep
Adits - Yes X , No___, # 3 , Comment Collapsed; #1, flowing; #2 and #3 caved
Pits - Yes___, No X , # ___, Comment
Placers - Yes___, No X , # ___, Comment
Other - Yes___, No X , # ___, Comment

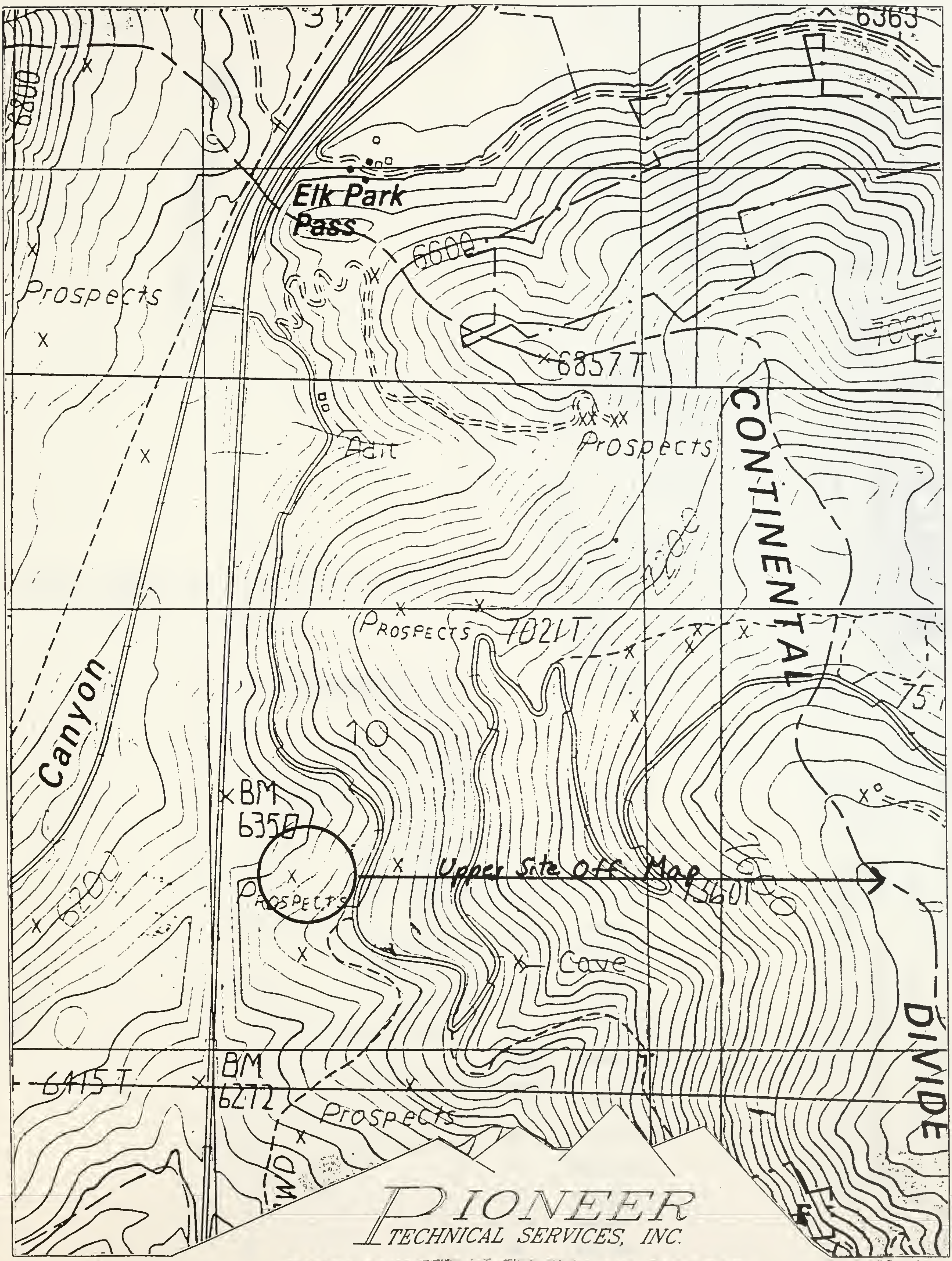
Mill Operation? Yes___, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

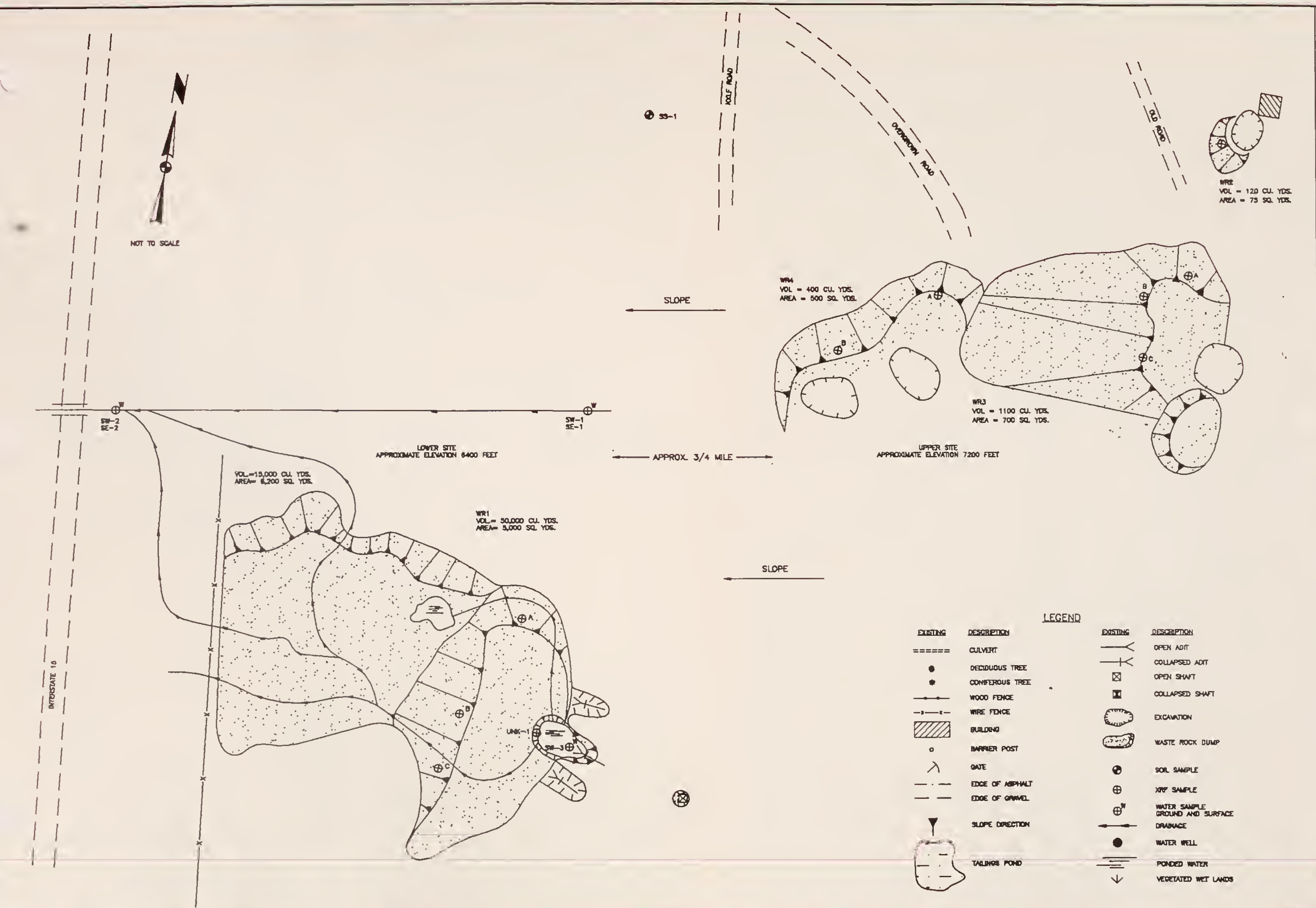
ll No.	Location	Depth	Yield	Static Water Level
M:50024	03N 07W 03	105.0	20.0	10.00
M:50025	03N 07W 03 BAC	215.0	15.0	0.00
M:127869	03N 07W 03 CAA	40.0	40.0	8.00
M:127989	03N 07W 03 D	45.0	25.0	20.00
M:50026	03N 07W 03 DA	40.0	0.0	10.00
M:50027	03N 07W 03 DB	280.0	3.0	80.00
M:50028	03N 07W 14 CBCA	60.0	7.0	4.00
M:50030	03N 07W 15 CCC	14.0	10.0	5.00
M:50029	03N 07W 15 CCC	58.0	0.0	28.00
M:130883	03N 07W 15 CCDB	20.0	3.8	1.75
M:130887	03N 07W 15 CCDD	28.0	0.9	20.25
M:50028	03N 07W 14 CBCA	60.0	7.0	4.00



PIONEER
TECHNICAL SERVICES, INC.

MARY EMME/CLINTON, P.A. NO. 47-035

T03N, R07W, SECTION 10
SCALE: 1" = 1000'



DRAWN CAJ DATE 11/23/93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MARY EMMEE/CLINTON PA# 47-035
ELK PARK DISTRICT SILVER BOW COUNTY

SHEET NO.

47-035.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	65,000	On east side of WR-1 near top	None	< 3.5 (D)	0.06	47-035-WR-1	08/20/93 2230	T-Metals, ABA
WR-1B	WR		North of adit near top of slope	None	< 3.5 (D)	0.08			
WR-1C	WR		West of adit near top of the west side of dump	None	3.8 (D)	0.05			
WR-2	WR	400	On north side of WR-2 approx. 1' from top	None	4.8 (D)	0.08	47-035-WR-2	08/20/93 2340	T-Metals, ABA
WR-3A	WR	1,100	Small lobe on far north side of WR-3	None	< 3.5 (D)	0.06			
WR-3B	WR		On north lobe (largest) near top	None	< 3.5 (D)	0.08			
WR-3C	WR		On southern (large) lobe near top	None	< 3.5 (D)	0.06			
WR-4A	WR	400	On east side of WR-4 on top	None	4.6 (D)	0.07			
WR-4B	WR		West side of WR-3 near top of hole	None	5.6 (D)	0.07			
UNK-1	UNK		Material used to create berm for discharge pond at Adit #1	None	4.8 (D)	0.08	N/A	N/A	XRF Analysis
SS-1	BKGRND	N/A	Background soil in valley below WR-1; above site and valley floor	N/A	N/A	N/A	47-035-SS-1	08/20/93 1900	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 47-035-WR-1 is composite of WR-1A through -1C (lower area of the site). 47-035-WR-2 is composite of WR-2, WR-3A through -3C, and WR-4A and -4B (upper area of the site).

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_1__ Identification:_Adit #1____

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_587__

Distance to nearest well used for drinking?_1 mile____________

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Sulfides present in mine waste, probably present in adit; water flowin out of adit is slightly acidic.

Other observations/notes:_N/A____________

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Adit discharge at WR-1	25 gpm (M)	5.40	136	133	NM	11	N/A	47-035-SW-3	08/20/93 1830	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Unnamed tributary

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes X , No ___, Name(s)/Description: Water flows from Adit #1 into a small settling pond on top of WR-1, then flows down both sides of WR-2 into another low area forming a second pond at the base of the dump, from there it flows to unnamed tributary.

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Waste rock

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 13 gpm
High Flow: 150 gpm , Average Flow: 15 gpm

Distance between waste source(s) and nearest surface water body (ft)? Approx. 100 feet separates base of WR-1 and unnamed tributary. Water in both ponds sit on waste rock.

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Water from Adit #1 flows across WR-1 in several places.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Water appears to flow into drainage that ends in the East Pit area of the Berkley Pit; this water may end up in the Berkley Pit.

Observed erosional/sedimentation/stream turbidity problems? Yes X , No _____, Distance downstream (ft)? 75 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Waste rock is present in stream sediments until water goes into culvert. Iron precipitate is present along the path of drainage from adit.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Flammang

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient in tributary approx. 50′ above WR-1	6.86	129	341	NM	69	1 gpm (M)	47-035-SW-1	08/20/93 1900	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Upgradient in tributary approx. 50′ above WR-1	N/A	N/A	N/A	N/A	N/A	N/A	47-035-SE-1	08/20/93 1900	T-Metals
SW-2	SW	10′ above point that tributary enters culvert to flow under interstate	3.72	237	239	NM	0	13 gpm (M)	47-035-SW-2	08/20/93 1800	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	10′ above point that tributary enters culvert to flow under interstate	N/A	N/A	N/A	N/A	N/A	N/A	47-035-SE-2	08/20/93 1800	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. two acres at base of WR-1

Wetlands present: Yes X , No ___, Describe: Streamside downgradient o WR-1 and in lower drainage area of adit discharge, probably at most 1/8 acre.

Carbonate rocks/soils: Yes ___, No X , Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater X ; Comments___

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3; pH; Vegetation	Partial	118,800	118,800	Yes	Low
WR-2	SO3; pH	Dry	675	675	Yes	Low
WR-3	SO3; pH	Dry	6,300	6,300	Yes	Low
WR-4	SO3; pH	Dry	4,500	4,500	Yes	Low
Adit #1	pH; FEOX; Moss	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications: Several very small stressed pine trees on WR-1.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:________________________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________________________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Upper site is on road with locked gate; lower site is off I-15, easily accessed across barbed wire fence at base of site.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________________
Wilderness Area - Yes___, No_X_, Comment________________
T&E Species Habitat - Yes___, No_X_, Comment________________
Bat Habitat - Yes___, No_X_, Comment________________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High_X_, Medium___, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_3_, types and locations: Shaft #3 and #4 on upper site; Shaft #1 (stope/air vent) on lower site

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_3_, types and locations: WR-1, -3, and -4 are all steep, unvegetated, and at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Mary Emmee/Clinton, Prepared by Northern Engineering and Testing, July 15, 1988.

USGS, Topographic Map, Elk Park Pass, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

MARY EMMEE/CLINTON
PA NO. 47-035

Mary Emmee/ Clinton PA# 47−035
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 08/20/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47−035−SE−1	110	205 J	29 J	13.5 U	10.2	1230	9470	0.232 U	480 J	17.6 U	119	42.6 U	4420 J	NR
47−035−SE−2	48.8	39 J	1.2 U	7.65 J	12.7	347	26400	0.062 U	762 J	5.69 U	91.8	13.8 U	577 J	NR
47−035−WR−2	263	45.1 J	0.4 U	4.67 J	2.33	365	33300	1.27	144 J	3.07	1670	235	1200 J	NR
47−035−WR−1	216	23.4 J	1.8 J	2.09 U	1.47 U	422	17600	0.833	51.5 J	2.72 U	834	61.8	865 J	NR
BACKGROUND	143	228 J	3.7 J	9.72 J	6.81	447	20200	0.177	480 J	3.84	156	6.01 U	911 J	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
47−035−WR−1	1.04	32.5	−4.0	−36.	0.49	0.09	0.46	2.81	−6.58
47−035−WR−2	2.45	76.5	−1.0	−77.	0.69	0.66	1.1	20.6	−21.7

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47−035−SW−1	3.89 J	33.4	2.57 U	9.7 U	6.83 U	13.3 J	64.3 J	0.12 U	12.7	12.7 U	1.56	30.7 U	248	60.3
47−035−SW−2	1.69 U	21.9	27.9	16.9	6.83 U	2670 J	863 J	0.12 U	2590	12.7 U	4	30.7 U	7970	136
47−035−SW−3	65.6 J	2.01 U	29.7	9.7 U	6.83 U	1260 J	19100 J	0.12 U	2120	12.7 U	28.6	30.7 U	4710	84.7

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
47−035−SW−1	148	< 5.0	29	< 0.05	NR
47−035−SW−2	432	< 5.0	281	< 0.05	NR
47−035−SW−3	8	< 5.0	134	< 0.05	NR

LEGEND

SE1 − Upgradient of tributary approx. 50' above waste rock dump 1.
SE2 − 10' above where tributary enters culvert going under freeway.
WR1 − Composite of subsamples WR1A, 1B, and 1C.
WR2 − Composite of subsamples WR2, 3A, 3B, 3C, 4A, and 4B.
BACKGROUND − From Mary Emmee/Clinton Mine (47−035−SS−1).
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.
SW3 − Adit discharge of waste rock dump 1.

XRF ANALYSIS RESULTS

MARY EMMEE/CLINTON
PA NO. 47-035

Mine Name: Mary Emmee/Clinton PA# 47-035
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
47-035-SS-1		16325.8	15794	2937.84		988.404 *	28457.1		667.585	933.394	186.479	342.56
47-035-UNK-1		18051.6	1463.07	1118.89		232.911 *	4420.29		116.266 *	73.4875 *		249.507
47-035-WR1-A		29504.9	2610.85	1214.79		254.352 *	21919.2		423.045	311.713	192.919 *	43.3419
47-035-WR1-B		25853.4	3578.36	885.135		365.199 *	22287.8		250.368	1303.1	109.72 *	68.0868
47-035-WR1-C		33784.3	2894.32	1888.96		963.396 *	61945.7		403.147	1585.19	678.051	143.389
47-035-WR3-A		15583.6	2070.19	317.072 *			19850		122.883 *	1636.06	153.066 *	6.73078 *
47-035-WR3-B		35549.9	1871.66	978.338		258.243 *	21477.9		573.382	668.581	155.068 *	38.69
47-035-WR3-C		25587	2231.39	585.768		387.107 *	13473.1		309.621	1131.78	371.667 *	24.2349
47-035-WR4-A		21071	2880.55	2290.75		453.72 *	42980.4		145.247 *	675.342	146.112 *	167.246
47-035-WR4-B		19156.3	8470.8	2106.49		633.187 *	32823.5		401.233	1371.68	106.726 *	214.686
47-035-WR-1-COMP		35798.9	2588.9	1600.29			34584.1		348.681	813.763	291.479 *	87.925
47-035-WR-2		25230.2	6902.28	1251.39		967.449 *	19021.7		349.022	930.581		178.963
47-035-WR-2-COMP		20867.6	4277.89	1586.16	128.08 *		21706.3		320.228	1102	101.575 *	104.517

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
47-035-SS-1	146.385			134.942	127.096			414.698		13.4125 *	13.8526 *
47-035-UNK-1	115.052		6.94376 *	344.268	71.1262			211.026		17.1135 *	17.4012 *
47-035-WR1-A	84.9667			893.059	173.353		436.782	211.854	106.817 *	13.9066 *	25.6738 *
47-035-WR1-B	88.3515		6.74782 *	441.202	244.141			141.711	81.8291 *	19.1235 *	10.6897 *
47-035-WR1-C	108.697		39.9268	1959.35	252.772	164.99 *	270.991	561.273	146.714 *		23.008 *
47-035-WR3-A	43.8696		73.8157	2489.21	79.9452		966.765	27.2969 *	276.195		29.9394 *
47-035-WR3-B	68.6692		16.0634 *	1529.27	204.635		589.273	207.888	146.676 *		28.9553 *
47-035-WR3-C	80.368		36.8443	2768.88			1282	90.5366	295.374		35.8231 *
47-035-WR4-A	129.549		42.6491	837.44	159.528		242.376	464.865	126.61 *		21.0547 *
47-035-WR4-B	95.8039		10.1256 *	648.19	135.005		221.592	371.598	86.4933 *	15.4253 *	48.0097
47-035-WR-1-COMP	121.656		22.2633	1096.31	233.663		265.667	304.561	107.274 *		20.676 *
47-035-WR-2	107.756		5.00547 *	787.288	177.801			390.503	89.4387 *	16.8622 *	27.8849 *
47-035-WR-2-COMP	100.803		24.7845	1129.51	157.146		421.512	226.337			20.4212 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MARY EMMEE/CLINTON
PA NO. 47-035

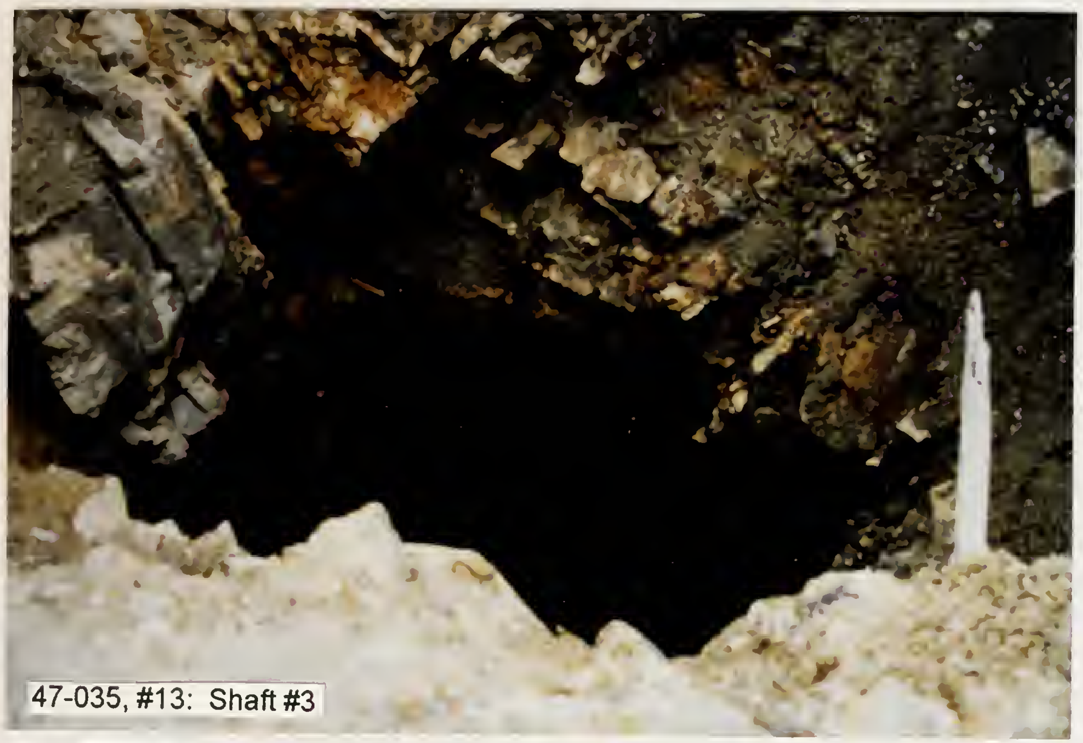
AIMSS SCORESHEET

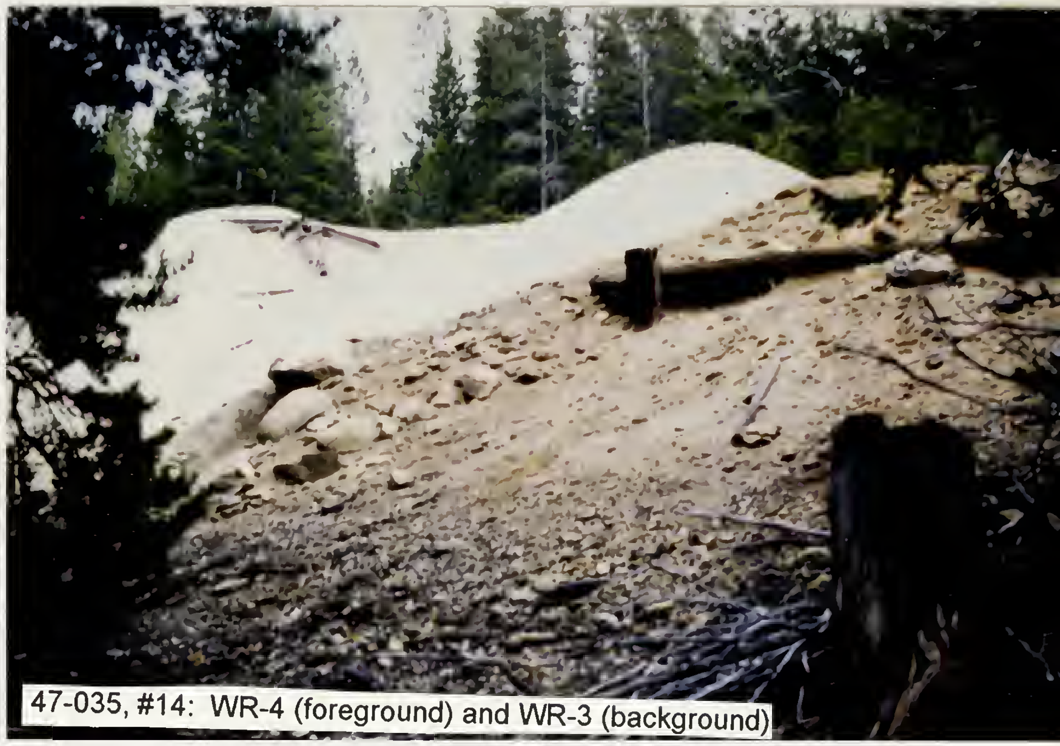
SITE NAME: MARY EMMEE/CLINTON
PA NUMBER: 47-035

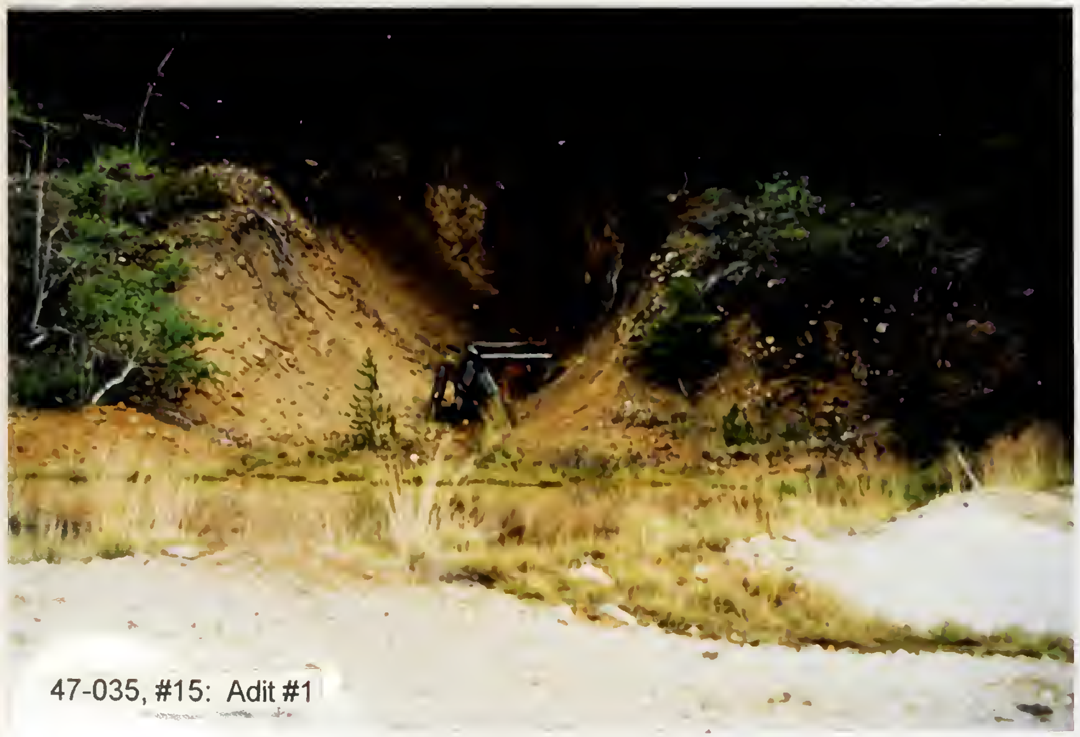
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	31.501
6	GW - TARGETS	WELLS - 1 MI. x 2.5		30.0
7		WELLS - 1 TO 4 MI		575
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	605.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	3811621
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	34.936
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	0
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.080
29	AIR - TARGETS	POPULATION - 4 MILES		10000
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10010
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	540540
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.994
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	10
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	497
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**43.53**

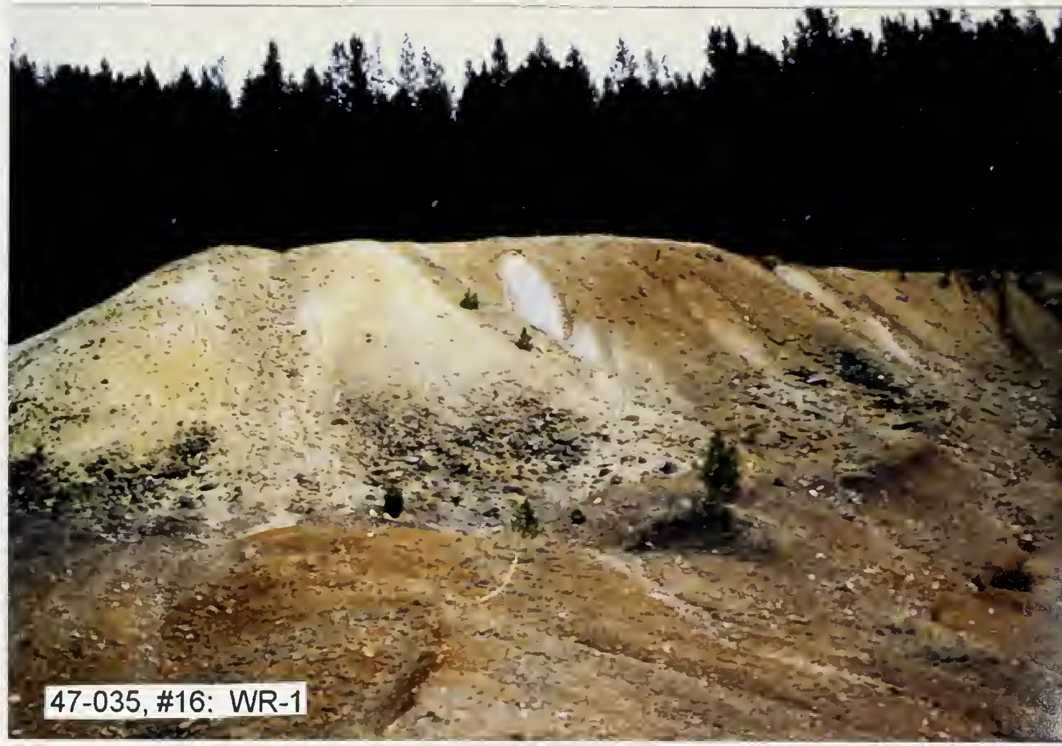
SITE NAME: MARY EMMEE/CLINTON
PA NUMBER: 47-035

LINE NO.	SITE SAFETY			
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	300
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	300
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	10
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**30.00**


47-035, #13: Shaft #3


47-035, #14: WR-4 (foreground) and WR-3 (background)


47-035, #15: Adit #1


47-035, #16: WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: RISING SUN PA#: 47-037

Date: September 14, 1993 Time: 1500-1600

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Partly cloudy; approx. 60°F; calm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #26: Adit #1, GW-1 sample location; #27: WR-1. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Grade, amend, and revegetate dump material.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): RISING SUN **PA#:** 47-037

Legal Description: T 3N ;R 7W ;Sec. 22 , NE1/4 SW1/4 ___1/4

County: SILVER BOW **Mining District:** ELK PARK

Latitude: N 45° 59' 47" **Longitude:** W 112° 27' 27"

Primary Drainage Basin and Code: Silver Bow Creek/17010201
Secondary Drainage Basin: Tramway Gulch

USGS Quadrangle map name(s): Homestake

Mine Type/Commodities: Hardrock/Silver, Copper
Activity Status: Active___, Inactive/Exploration___, Abandoned X .

Ownership status: Known Y X N___; private/public? Private/Public
Owner, Agent, or Contact (Include address and phone when available): Steven Guidoni, 1720 C Street, Butte, MT 59701. (406) 723-5013; Lee McDonald, P.O. Box 100505, Denver, CO 80250. (303) 777-2389 or (303) 830-7244; James Walters, 851 144th Avenue NE, Bellevue, WA 98007; Inland Properties, Inc., P.O. Box 8182, Missoula, MT 59807; Keith Holman, P.O. Box 71, Veradale, WA 99037; American Acres, Inc., c/o Scott Moger, 205 Third Avenue 12D, New York, NY 10003. (212) 759-1924; Deerlodge National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6240' , Slope Gentle ,
Aspect Western

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 0.7 acres.
Dimensions: 175 feet x 160 feet

Predominant vegetation types: Aspen, Lodgepole pine, Douglas fir, spruce, willow, potentilla, grasses

Access: roads - good___, poor___, 4wd X , trail___.
Other logistical considerations (proximity to other sites).___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 47 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Adit discharge makes up headwaters of Tramway Gulch, which flows west and then north to confluence with Blacktail Creek 2 to 2.5 miles below the site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

Shafts - Yes___, No X , # ____, Comment

Adits - Yes X , No___, # 1 , Comment Big tunnel; open

Pits - Yes___, No X , # ____, Comment

Placers - Yes___, No X , # ____, Comment

Other - Yes___, No X , # ____, Comment

Mill Operation? Yes____, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

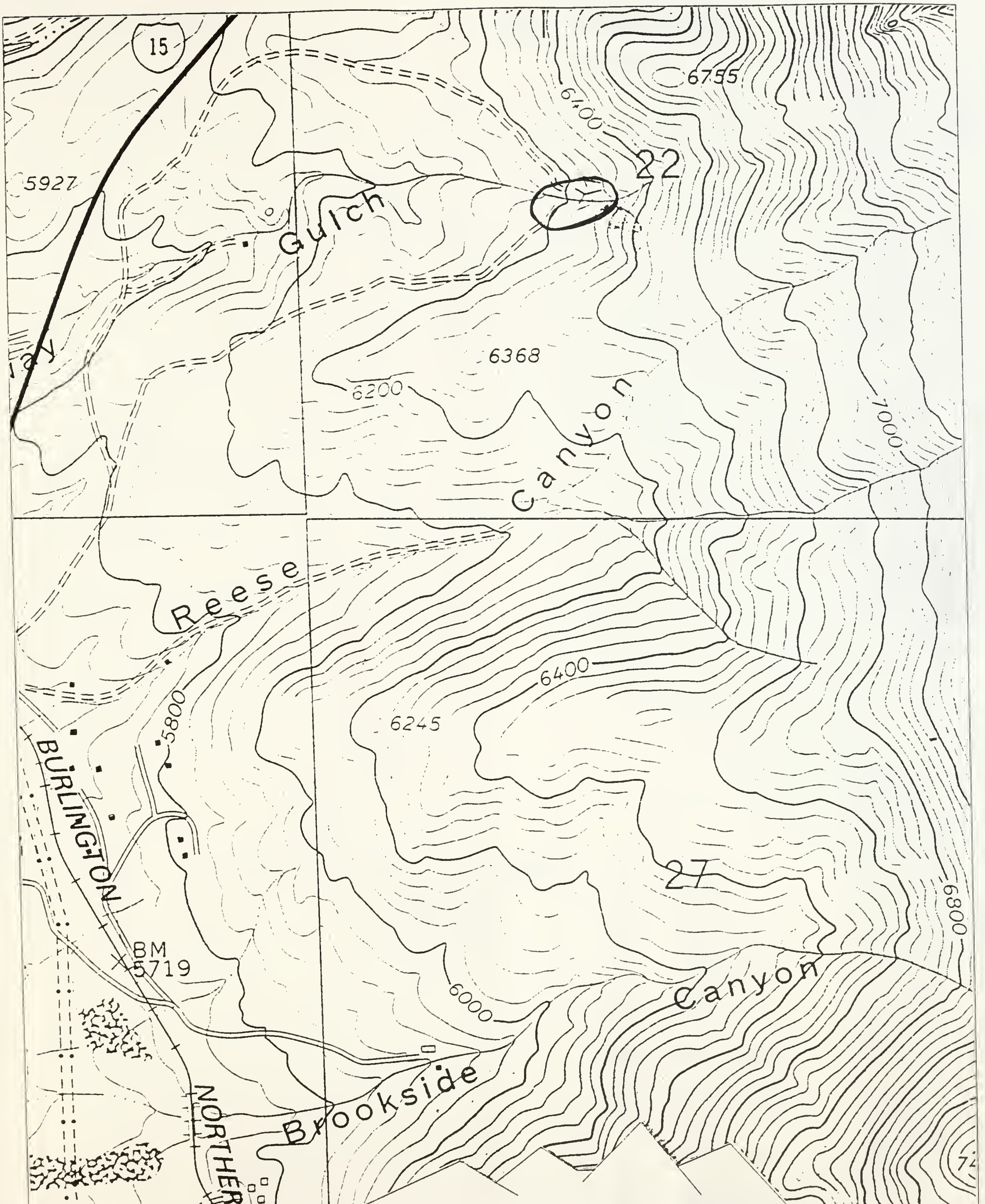
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? N/A

Montana Bureau of Mines and Geology
Water Well Log Data

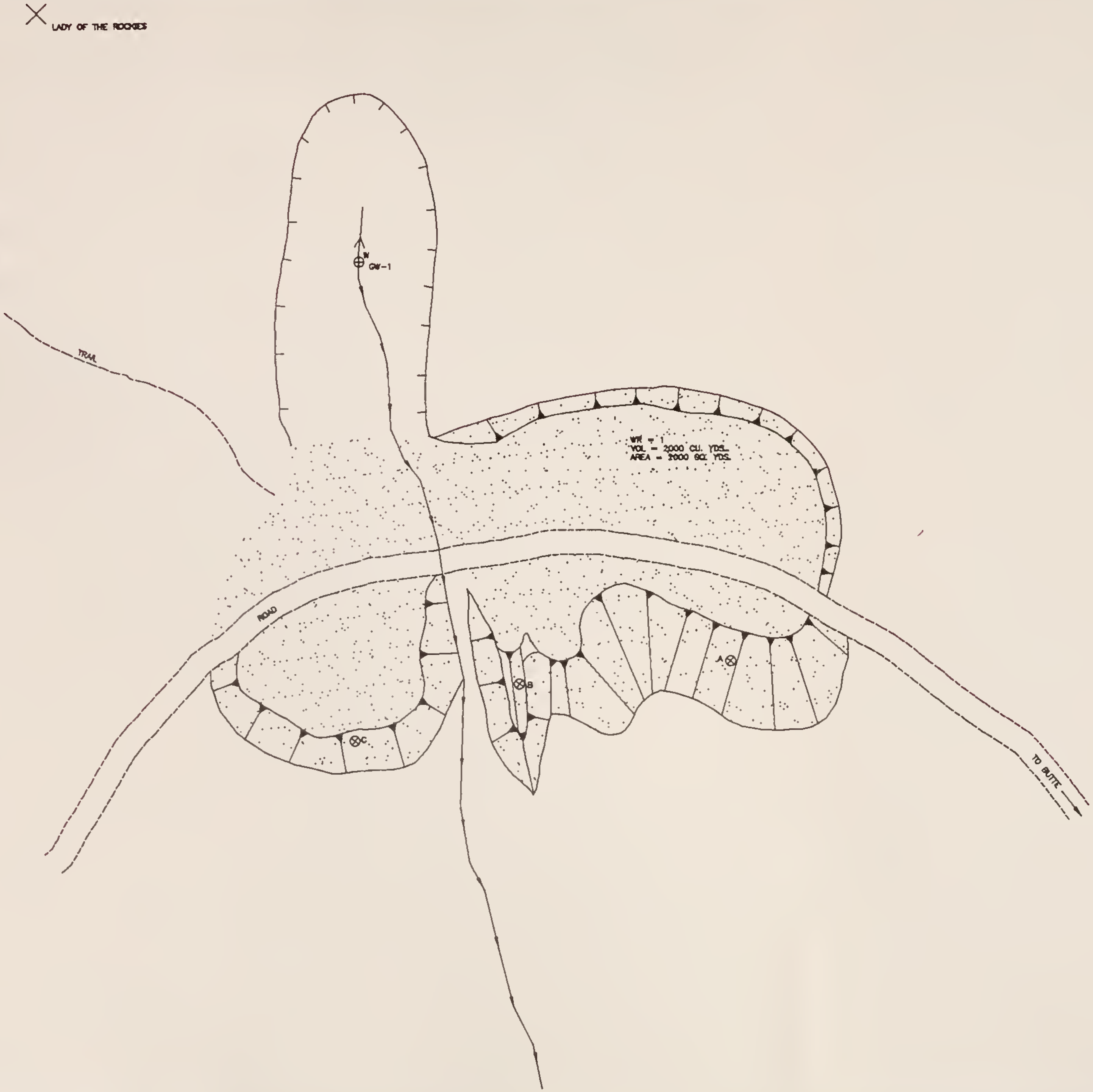
11/15/1993

Well No.	Location	Depth	Yield	Static Water Level
M:50028	03N 07W 14 CBCA	60.0	7.0	4.00
M:50030	03N 07W 15 CCC	14.0	10.0	5.00
M:50029	03N 07W 15 CCC	58.0	0.0	28.00
M:130883	03N 07W 15 CCDB	20.0	3.8	1.75
M:130887	03N 07W 15 CCDD	28.0	0.9	20.25
M:127870	03N 07W 16	110.0	20.0	0.00
M:50031	03N 07W 16	18.0	10.0	10.00
M:50058	03N 07W 21	75.0	30.0	45.00
M:50059	03N 07W 23 BA	180.0	20.0	60.00
M:122504	03N 07W 27 CC	105.0	30.0	70.00
M:50061	03N 07W 28	102.0	20.0	67.00
M:50064	03N 07W 28	100.0	25.0	60.00
M:50065	03N 07W 28	130.0	25.0	0.00
M:50060	03N 07W 28	45.0	10.0	11.00
M:50062	03N 07W 28	103.0	60.0	0.00
M:50063	03N 07W 28	170.0	12.0	40.00
M:50066	03N 07W 28 AA	65.0	30.0	25.00
M:50067	03N 07W 28 ABBC	90.0	10.0	0.00
M:50068	03N 07W 28 ABC	100.0	40.0	50.00
M:50069	03N 07W 28 ACAB	90.0	10.0	0.00
M:50070	03N 07W 28 ACC	120.0	25.0	70.00
M:50071	03N 07W 28 ACCC	50.0	13.0	0.00
M:50072	03N 07W 28 ACDA	200.0	30.0	0.00
M:50073	03N 07W 28 ACDD	140.0	15.0	0.00
M:50074	03N 07W 28 AD	104.0	50.0	70.00
M:[illegible]0075	03N 07W 28 ADB	204.0	25.0	127.00
M:50076	03N 07W 28 ADB	150.0	15.0	0.00
M:50077	03N 07W 28 ADCB	224.0	25.0	0.00
M:50078	03N 07W 28 BADD	34.0	12.0	18.00
M:50079	03N 07W 28 C	50.0	15.0	25.00
M:50080	03N 07W 28 C	112.0	30.0	55.00
M:50081	03N 07W 28 CBD	115.0	15.0	44.00
M:125795	03N 07W 28 CC	76.0	25.0	41.00
M:128063	03N 07W 28 CC	141.0	20.0	60.00
M:4714	03N 07W 28 CCA	120.0	25.0	65.00
M:50083	03N 07W 28 CCA	137.0	25.0	75.00
M:50084	03N 07W 28 CD	0.0	5.0	40.00
M:50086	03N 07W 28 CD	89.0	20.0	66.00
M:50087	03N 07W 28 CD	109.0	20.0	40.00
M:50085	03N 07W 28 CD	150.0	30.0	0.00
M:127994	03N 07W 28 CD	125.0	15.0	50.00
M:50088	03N 07W 28 CDC	47.0	25.0	24.00
M:50089	03N 07W 28 D	50.0	15.0	20.00
M:50090	03N 07W 28 DA	165.0	20.0	37.00
M:50091	03N 07W 28 DACB	140.0	20.0	0.00
M:50092	03N 07W 28 DBAB	70.0	15.0	34.00
M:50093	03N 07W 28 DDD	12.0	1.0	8.00



PIONEER
TECHNICAL SERVICES, INC.

RISING SUN, P.A. NO. 47-037
T03N, R07W, SECTION 22
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
======	CULVERT	——<	OPEN ADIT
☼	LIGHT (LIGHT POLE)	—+—<	COLLAPSED ADIT
⌀	UTILITY POLE	☒	OPEN SHAFT
●	DECIDUOUS TREE	⧓	COLLAPSED SHAFT
✱	CONIFEROUS TREE	⬭	EXCAVATION
—•—•—	WOOD FENCE	⬭	WASTE ROCK DUMP
—x—x—	WIRE FENCE	⨯⨯⨯	COLLAPSED TIMBERS
▨	BUILDING	—+—+—	RAILS
○	BARRIER POST	◕	SOIL SAMPLE
⋌	GATE	⊕	XRF SAMPLE
— · —	EDGE OF ASPHALT	⊕W	WATER SAMPLE GROUND AND SURFACE
— —	EDGE OF GRAVEL	—◆—◆—	DRAINAGE
▼	SLOPE DIRECTION	●	WATER WELL
⬭	TAILINGS POND	≡	PONDED WATER
		↓	VEGETATED WET LANDS

47-037.DWG

DRAWN CAJ DATE 11/15/93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER
TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

RISING SUN PA# 47-037
ELK PARK DISTRICT SILVER BOW COUNTY

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,000	South end of dump; brown coarse sand	None	7.0 (D)	0.05	47-037-WR-2	09/14/93 1830	T-Metals, ABA
WR-1B	WR		Center of dump; brown coarse sand	None	6.9 (D)	0.04			
WR-1C	WR		North end of dump; brown coarse sand	None	6.9 (D)	0.05			

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 47-037-WR-1 is composite of WR-1A through -1C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No ___, Number: 1 Identification: Adit #1

Filled shafts: Yes ___, No X, Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X, Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes X, No ___;
Number of well logs: 735

Distance to nearest well used for drinking? Approx. 1/2 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ___, Probable ___, Possible X, Unlikely ___.
Contamination is possible, but not very likely due to general lack of mineralization and near normal field parameter measurements.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Bullock, Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Open discharging Adit #1	20 gpm (E)	7.28	NM	196	NM	78	N/A	47-037-GW-1	09/14/93 1500	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not measured due to SC meter and temperature probe not working properly.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Adit discharge makes up the headwaters of the Tramway Gulch, which is perennial in this upper reach.

Dry streambeds: Yes ____, No X , Name(s):

Other surface water: Yes ____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Adit discharge flows briefly through the dump material.

Approximate Flood frequency? ___1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? Approx. 20 during sampling
High Flow: 50 gpm , Average Flow: 20 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Adit discharge flows briefly through dump material.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Possible irrigation, stock watering, and residential use

Observed erosional/sedimentation/stream turbidity problems? Yes _____, No X , Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

*FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No samples taken because of very low XRF concentrations in dump material and neutral pH of water.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 0.5 acres of gently sloping meadow

Wetlands present: Yes___, No_X_, Describe:___

Carbonate rocks/soils: Yes___, No_X_, Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater_X_; Comments___

Nearest residence(ft or miles)? Approx. 0.5 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1A	None	Dry	18,000	17,000	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe: Litter; campfire rings

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes_X_, No___, Comment Possible

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High_X_, Medium___, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit #1

Hazardous structures: Yes___, No_X_, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Rising Sun, Prepared by Northern Engineering and Testing, August 2, 1988.

USGS, Topographic Map, Homestake, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

RISING SUN
PA NO. 47-037

Rising Sun PA# 47-037
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 09/14/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-037-WR-1	10 J	83.2	0.86 U	7.71	4.89	24.5	13500	0.661 J	311	4.04	9.26	5.9 UJ	37	NR
BACKGROUND	143	228 J	3.7 J	9.72 J	6.81	447	20200	0.177	480 J	3.84	156	6.01 U	911 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
47-037-WR-1	0.01	0.31	13.6	13.3	<0.01	<0.01	0.01	0	13.6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47-037-GW-1	3.06	15.1	4.59 U	5 U	6.24 U	2.33 U	13.7 U	0.12 U	3.76 U	10.9 U	1.22 U	31.7 U	8.71 U	98.6

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
47-037-GW-1	180	< 5	33	0.12	NR

LEGEND

WR1 - Composite of subsamples WR 1A, 1B, and 1C.
GW1 - Open, discharging adit #1.
BACKGROUND - From the Mary Emmee/Clinton Mine (47-035-SS-1).

XRF ANALYSIS RESULTS

RISING SUN
PA NO. 47-037

Mine Name: Rising Sun PA# 47-037
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
47-037-WR1-A		27878.8	19847.1	2187.39		1364.61	25484.1			44.0754 *	35.6376 *	387.538
47-037-WR1-B		18866.5	20623.2	2763.64		1270.21	34547.3			56.5773 *	56.4102 *	446.337
47-037-WR1-C		20816.7	20230.9	3891.85		1278.93	42020.3			88.5472 *	38.2001 *	488.982
47-037-WR-1-COMP		20106.8	21211.2	2305.19		1387.28	31289.3			67.3706 *		427.496

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
47-037-WR1-A	112.575				183.895			705.694			12.1844 *
47-037-WR1-B	180.419				156.721			566.182		10.6444 *	14.294 *
47-037-WR1-C	212.799				187.722			546.256			11.5843 *
47-037-WR-1-COMP	147.954				170.224			542.515			12.3823 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

RISING SUN
PA NO. 47-037

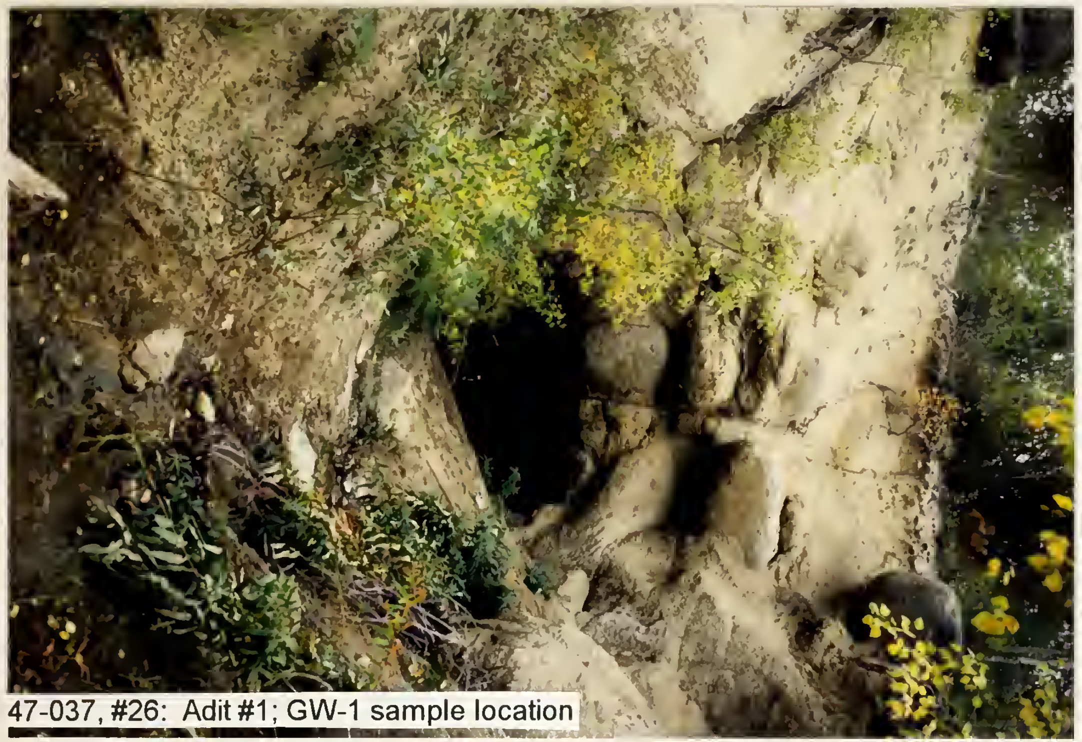
MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

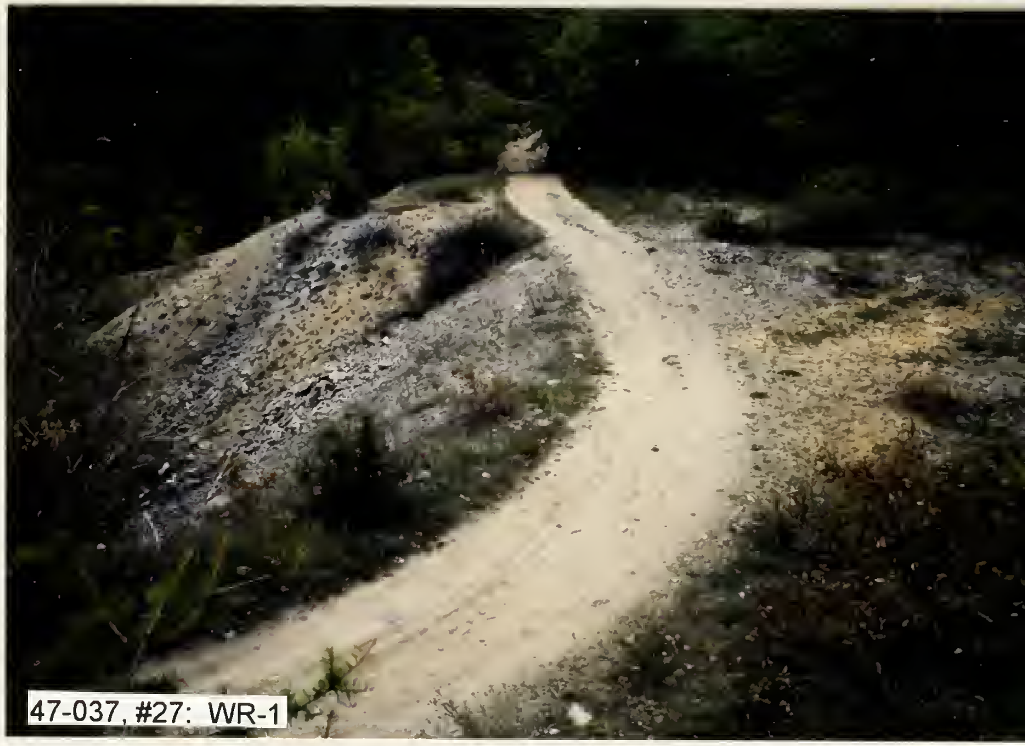
SITE NAME: RISING SUN
PA NUMBER: 47-037

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.601
6	GW - TARGETS	WELLS - 1 MI. x 2.5		117.5
7		WELLS - 1 TO 4 MI		688
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	810.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	194844
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.601
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	2
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	481
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29	AIR - TARGETS	POPULATION - 4 MILES		10000
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10015
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	100
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		30
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	40
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**1.95**

			SITE NAME:	RISING SUN
LINE NO.			PA NUMBER:	47-037
		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	40
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**40.00**



47-037, #26: Adit #1; GW-1 sample location



47-037, #27: WR-1

MELROSE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: OLD GLORY PA#: 47-027

Date: August 24, 1993 Time: 0845

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool; breezy; clear; sunny; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #23: Subsidence shaft and cabin; #24: Collapsed shaft; #1: WR-1; #2: WR-2 and collapsed adit; #3: WR-3. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Collapsed shaft and two collapsed adits on top of hill; no drainages nearby wet or dry.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Fill HMO; grade, amend, and revegetate waste rock dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): OLD GLORY PA#: 47-027

Legal Description: T 1S ;R 8W ;Sec. 31 , NW1/4 NW1/4 1/4

County: SILVER BOW Mining District: MELROSE

Latitude: N 45° 42' 40" Longitude: W 112° 38' 38"

Primary Drainage Basin and Code: Soap Gulch/10020004
Secondary Drainage Basin: Soap Gulch

USGS Quadrangle map name(s): Melrose

Mine Type/Commodities: Hardrock/Silver, Gold, Copper

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Hazel Dodgson and Vesta Hill, Box 102, Melrose, MT 59743. (406) 835-2251.

Relationship to other mines/sites in the area/district: This site is southwest of Moose Creek/Highland district.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 7520', Slope Moderate, Aspect South

Land use: Mining___, Recreational___, Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 1 acres.
Dimensions: Site dimensions are 400 feet x 100 feet

Predominant vegetation types: Bunch grass, sage brush, lupine

Access: roads - good___,poor X ,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site lies near summit of Old Glory Mountain, well above unnamed tributaries to Soap Gulch. Water leaving the site would flow south to tributaries and then south to confluence with Soap Gulch 1.5 miles below the mine. Site is underlain by vein deposit in Precambrian Belt argillites.

Mining/milling history, ore type/tenor, host rock, gangue: Mine possibly operated from 1935 to 1943. No other information available.

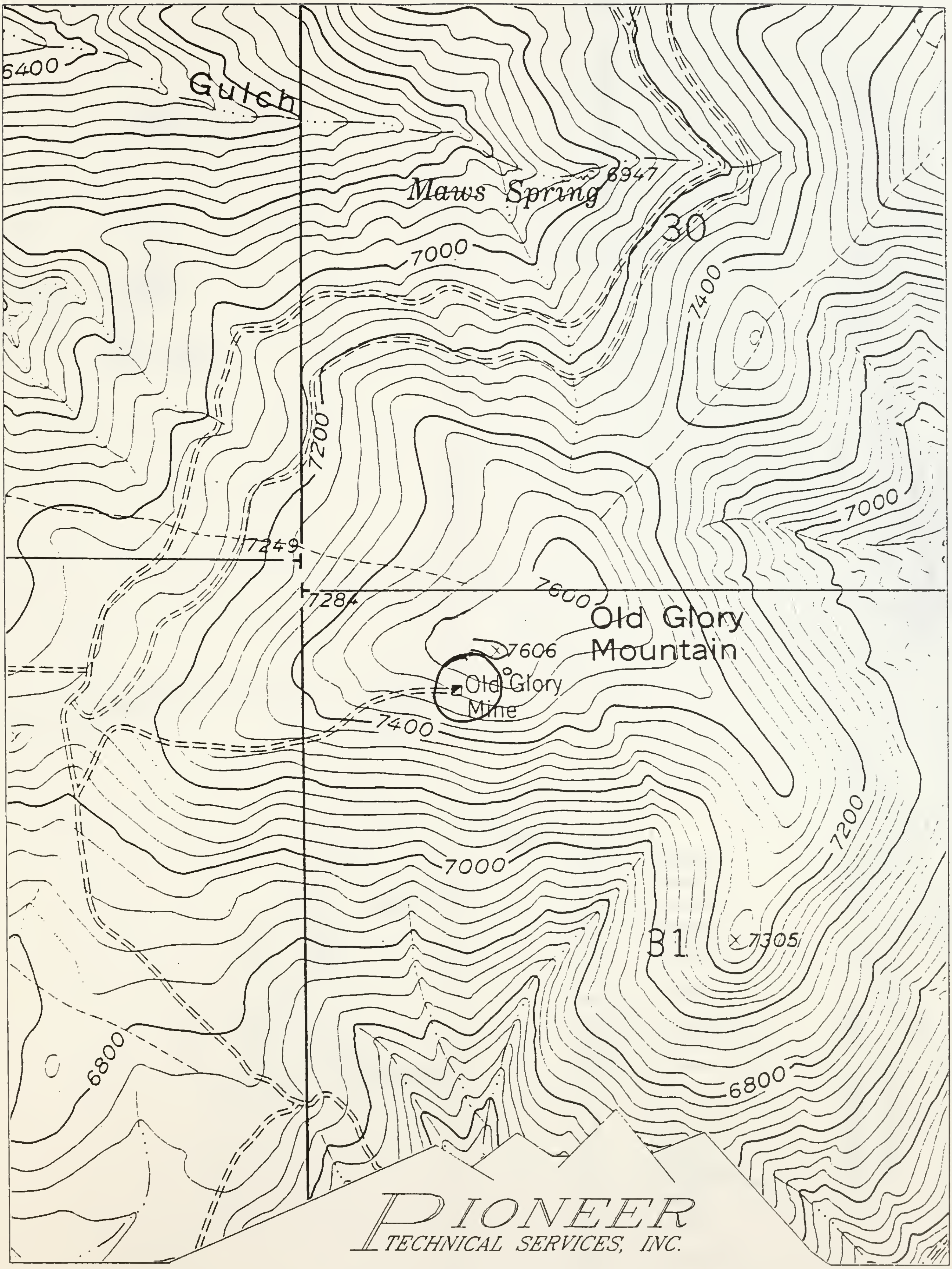
Mine Operation?
Shafts - Yes X , No ___, # 2 , Comment Collapsed
Adits - Yes X , No ___, # 2 , Comment Collapsed
Pits - Yes X , No ___, # 3 , Comment Exploration pits
Placers - Yes ___, No X , # ___, Comment ___
Other - Yes X , No ___, # ___, Comment Long exploration trench

Mill Operation? Yes ___, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

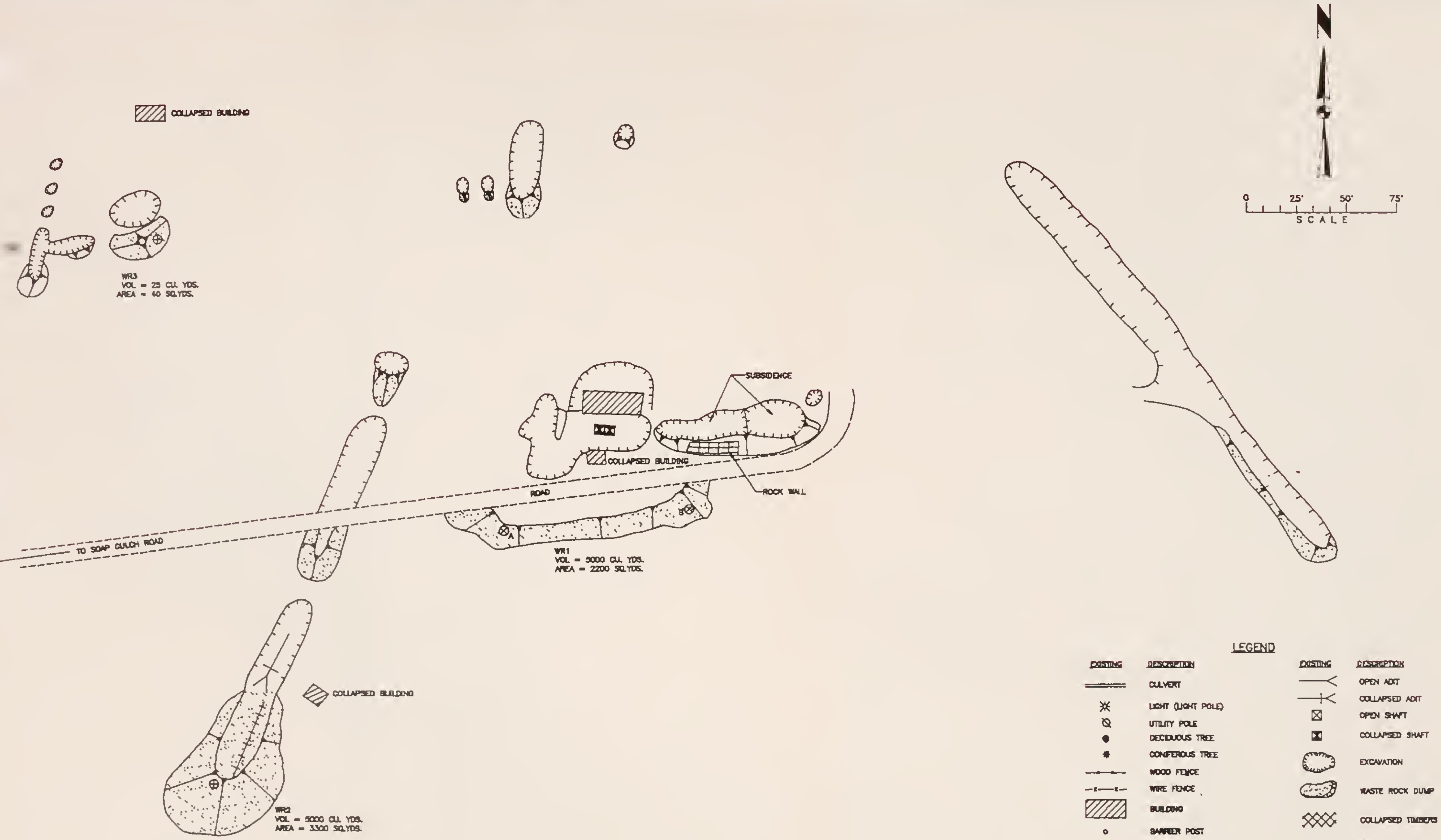
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

OLD GLORY, P.A. NO. 47-027

T01S, R08W, SECTION 31
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION	EXISTING	DESCRIPTION
═	CULVERT	—<	OPEN ADIT
✳	LIGHT (LIGHT POLE)	—+<	COLLAPSED ADIT
⦰	UTILITY POLE	☒	OPEN SHAFT
●	DECIDUOUS TREE	⧓	COLLAPSED SHAFT
✱	CONIFEROUS TREE	⬭	EXCAVATION
—•—	WOOD FENCE	⬭	WASTE ROCK DUMP
—x—x—	WIRE FENCE	⨯⨯⨯	COLLAPSED TIMBERS
▨	BUILDING	—•—	RAILS
∘	BARRIER POST	◕	SOIL SAMPLE
⋌	GATE	⊕	XRF SAMPLE
—·—·—	EDGE OF ASPHALT	⊕W	WATER SAMPLE GROUND AND SURFACE
— — —	EDGE OF GRAVEL	←—←	DRAINAGE
▼	SLOPE DIRECTION	●	WATER WELL
⬭	TAILINGS POND	≡	PONDED WATER
		↓	VEGETATED WET LANDS

DRAWN CAJ DATE 11/16/93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER
TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

OLD GLORY PA# 47-027
MELROSE DISTRICT SILVER BOW COUNTY

SHEET NO.

SHEETS

47-027.DWG

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	5,000	Double shaft dump; east side	None	6.7 (D)	0.07	47-027-WR-1	08/24/93 2245	T-Metals, ABA
WR-1B	WR		Double shaft dump; southwest side	None	6.8 (D)	0.05			
WR-2	WR	5,000	Lower adit dump; center	None	6.7 (D)	0.03			
WR-3	WR	25	Pit dump: center	None	6.5 (D)	0.05			

*D-Direct reading(Kelwey Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 47-027-WR-1 is composite of WR-1A and -1B, WR-2, and WR-3.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_30___

Distance to nearest well used for drinking?_Approx. 3 miles___

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X__.
Located high on hill top; no evidence of shallow groundwater.

Other observations/notes:_N/A___

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):______________________________

Dry streambeds: Yes____, No_X_, Name(s):______________________________

Other surface water: Yes____, No_X_, Name(s)/Description:______________

Waste materials within any floodplain: Yes____, No_X_ Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A

High Flow:___________, Average Flow:______________

Distance between waste source(s) and nearest surface water body (ft)?_

N/A

Surface water draining onto or through waste sources: Yes____, No_X_,

Describe:______________________________

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)

N/A

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X__, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 3 acres on top of hill

Wetlands present: Yes___, No X, Describe:___

Carbonate rocks/soils: Yes___, No X, Describe:___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 3 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	19,800	19,800	No	None
WR-2	None	Dry	29,700	29,700	No	None
WR-3	None	Dry	360	360	No	None

Notes and Clarifications:

MDSL AMRB/PIONEER 4/9/93

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments_None_____________

Evidence of recreational use on site: Yes___, No_X_, Describe:____________

Accessibility - Fences, warning signs, closed roads?_Closed road during hunting season_

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________
Wilderness Area - Yes___, No_X_, Comment____________
T&E Species Habitat - Yes___, No_X_, Comment____________
Bat Habitat - Yes___, No_X_, Comment____________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High_X_, Medium___, Low___
Fisheries Habitat and Species Classification - _Not Rated_
Sport Fishery Classification - _Not Rated_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___ Could possibly fall into shaft/workings near building.

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_ Old cabin by shaft

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_, types and locations:_Slope around collapsed shaft/workings_

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Old Glory, Prepared by Northern Engineering and Testing, October 18, 1988.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Old Glory, Prepared by Daphne Digrindakis, June 19, 1984.

MDSL/AMRB Files, Mineral Availability System Field Work Sheet, Author Unknown, Date Unknown.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Melrose, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

OLD GLORY
PA NO. 47-027

MDSL AMRB/PIONEER 4/9/93

Old Glory PA# 47−027
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 08/24/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47−027−WR−1	843	414 J	6.2	36.9	4.38	69.3	28300	0.608 J	11600	92.1 J	254	12.6 J	354	NR
BACKGROUND	56	169	0.8 JX	13.8	29.4	34.2	25300	0.014 U	462	26	30	4 UJ	119	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
47−027−WR−1	0.12	3.75	5.06	1.31	0.12	<0.01	0.01	0	5.06

LEGEND

WR1 −	Composite of subsamples WR1A, 1B, 2, and 3.
BACKGROUND −	From the Emma Mine (29−061−SS−1).

XRF ANALYSIS RESULTS

OLD GLORY
PA NO. 47-027

Mine Name: Old Glory PA# 47-027
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
47-027-WR1-A		29355.6	1903.63	1779.91		3097.62	68835.1	410.763 *		156.642	433.074	527.992
47-027-WR1-B		23703.1	2195.64	1712.24		3663.15	62373.4	445.791 *	185.949 *	639.856	2778.92	246.829
47-027-WR-1-COMP		21557.9	2353.75	1355.83		10510.3	62867.8			401.995	1207.75	241.84
47-027-WR-2		18334.8	2811.07	1311.53		21141.5	64978.8			164.8	615.597	313.467
47-027-WR-3		18256.1	2266.75	1232.36		10921.6	64431.4			1028.55	2419.52	174.531

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
47-027-WR1-A	168.932				123.155			676.782			6.60903 *
47-027-WR1-B	129.462			1163.17	116.382	195.684 *	173.27 *	364.066	337.272 *		
47-027-WR-1-COMP	111.009		5.58342 *	319.923	104.387			612.343			
47-027-WR-2	124.518				86.2251			1120.62	123.76 *		
47-027-WR-3	85.5715		5.63286 *	238.032	92.7517		69.7105 *	366.109	229.73 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

OLD GLORY
PA NO. 47-027

AIMSS SCORESHEET

SITE NAME: OLD GLORY
PA NUMBER: 47-027

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	10.921
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		30
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	30.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	13105
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	11.201
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	0
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.112
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	11
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.109
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.13**

SITE NAME: OLD GLORY
PA NUMBER: 47-027

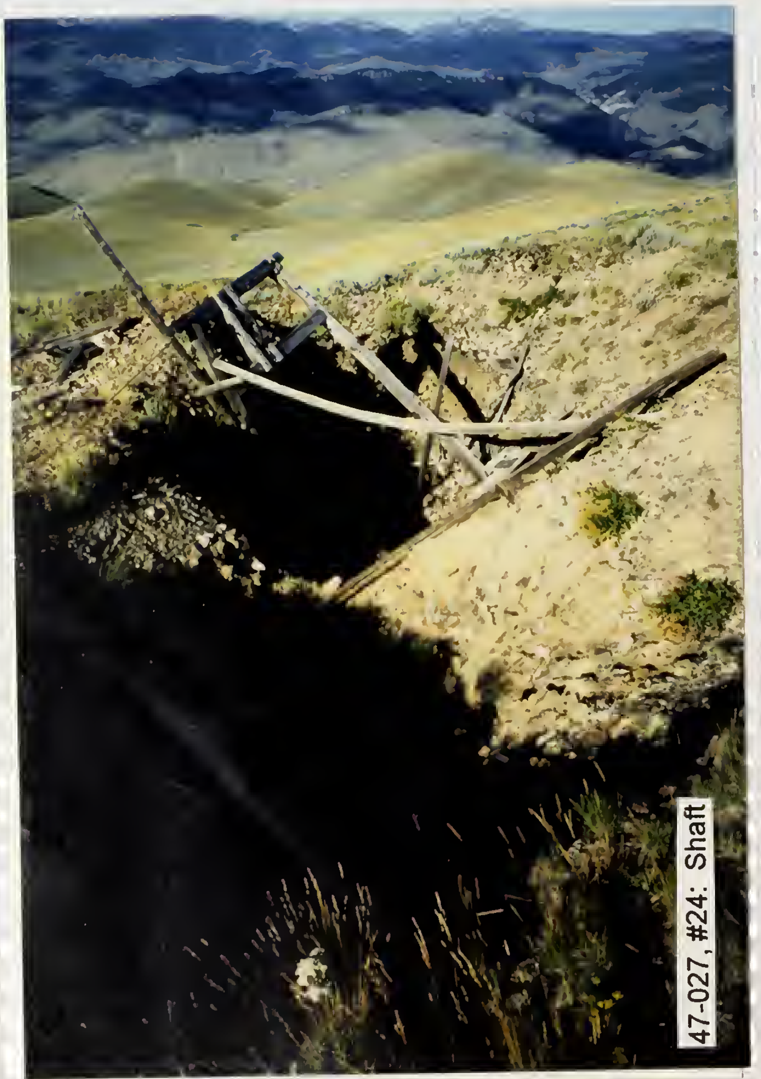
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	115
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

47-027, #1: WR-1

47-027, #2: WR-2 and Adit

47-027, #3: WR-3

47-027, #23: Subsidence shaft and cabin



47-027, #24: Shaft

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: CLIPPER PA#: 47-029

Date: August 24, 1993 Time: 1200-1500

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; cool; breezy; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #4: GW-1 sample location in caved adit with pond associated with WR-1; #5: WR-1; #6: SW-1 sample location downstream Wickiup Creek; #7: WR-2; #8: WR-5; #9: WR-6; #10: Stressed vegetation area; #11: WR-4 and shaft. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Some shafts are filled and some rock piles are recontoured.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate drainages from waste material; may have to remove WR-1 and WR-2 from drainage.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): CLIPPER PA#: 47-029

Legal Description: T 1S ;R 8W ;Sec. 26 , NE1/4NW 1/4___1/4

County: SILVER BOW Mining District: MELROSE

Latitude: N 45° 43' 30" Longitude: W 112° 33' 35"

Primary Drainage Basin and Code: Camp Creek/10020004
Secondary Drainage Basin: Wickiup Creek

USGS Quadrangle map name(s): Wickiup Creek

Mine Type/Commodities: Hardrock/Copper

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Clipper-Columbia, Inc., 2344 East Speedway Boulevard, Tucson, AZ 85719; Deerlodge National Forest.

Relationship to other mines/sites in the area/district: Unnamed mine 1/2 mile southeast; Old Glory mine 4 miles west.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Some reclamation; shaft filling recently and one shaft is fenced. Dump has been smoothed (no vegetation).

General site features: Elevation 6680' , Slope Low ,
Aspect East

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 11 acres.
Dimensions: 600 feet x 800 feet

Predominant vegetation types: Fir, willows

Access: roads - good X ,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is underlain by slates of the Belt Series (argillites). Site lies on and in the west side of perennial Wickiup Creek, just above confluence with unnamed tributary. Wickiup Creek flows southeast past the site to confluence with Camp Creek 1 3/4 miles away. The unnamed tributary flows east past the lower portion of the site.

Mining/milling history, ore type/tenor, host rock, gangue: Oxidized ore is malachite, azurite, and cuprite; sulfide ore is chalcopyrite, and pyrite. Gangue is quartz. No other information available.

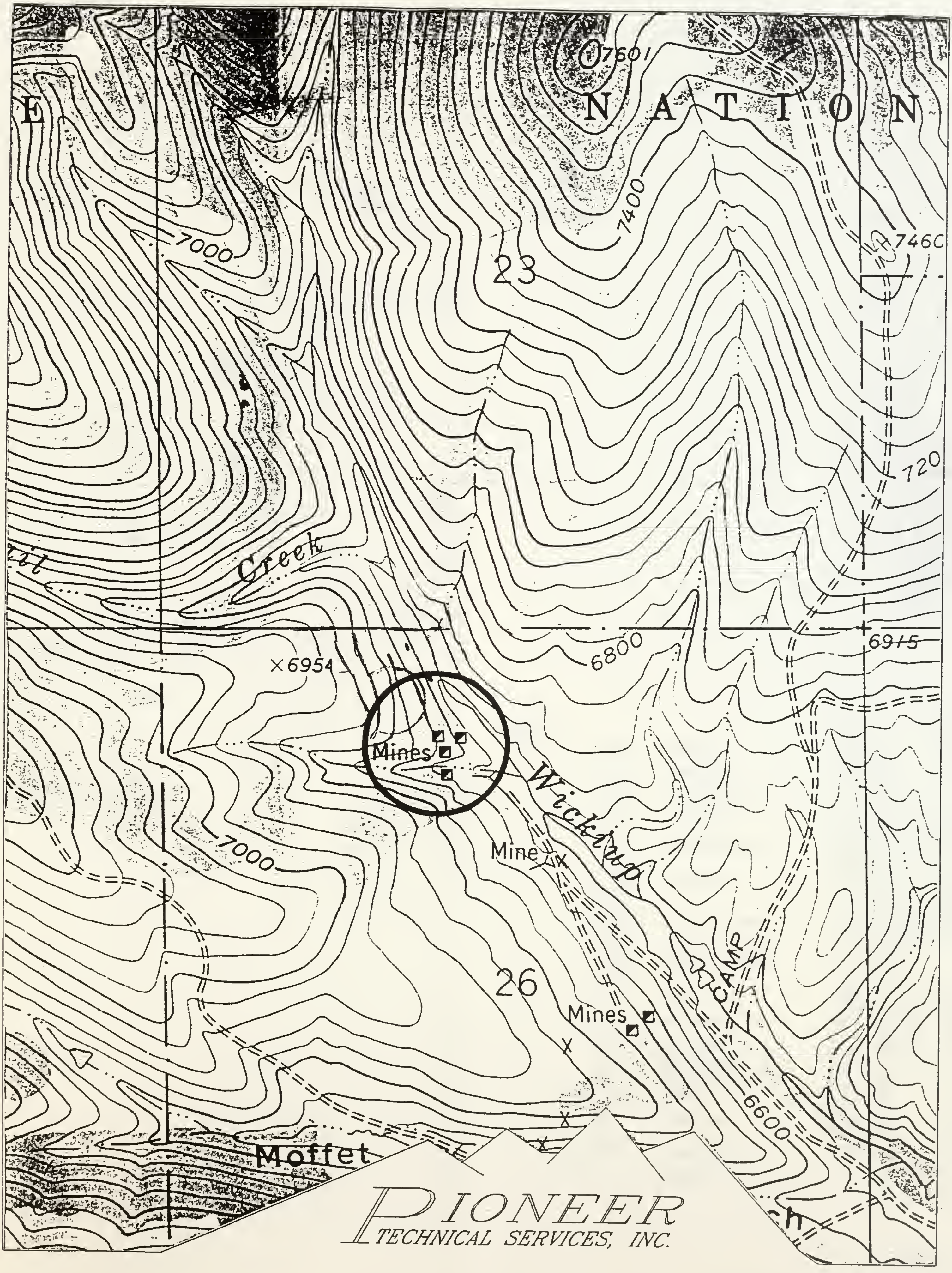
Mine Operation?
Shafts - Yes X, No ___, # 6, Comment One open
Adits - Yes X, No ___, # 1, Comment Flowing, collapsed
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

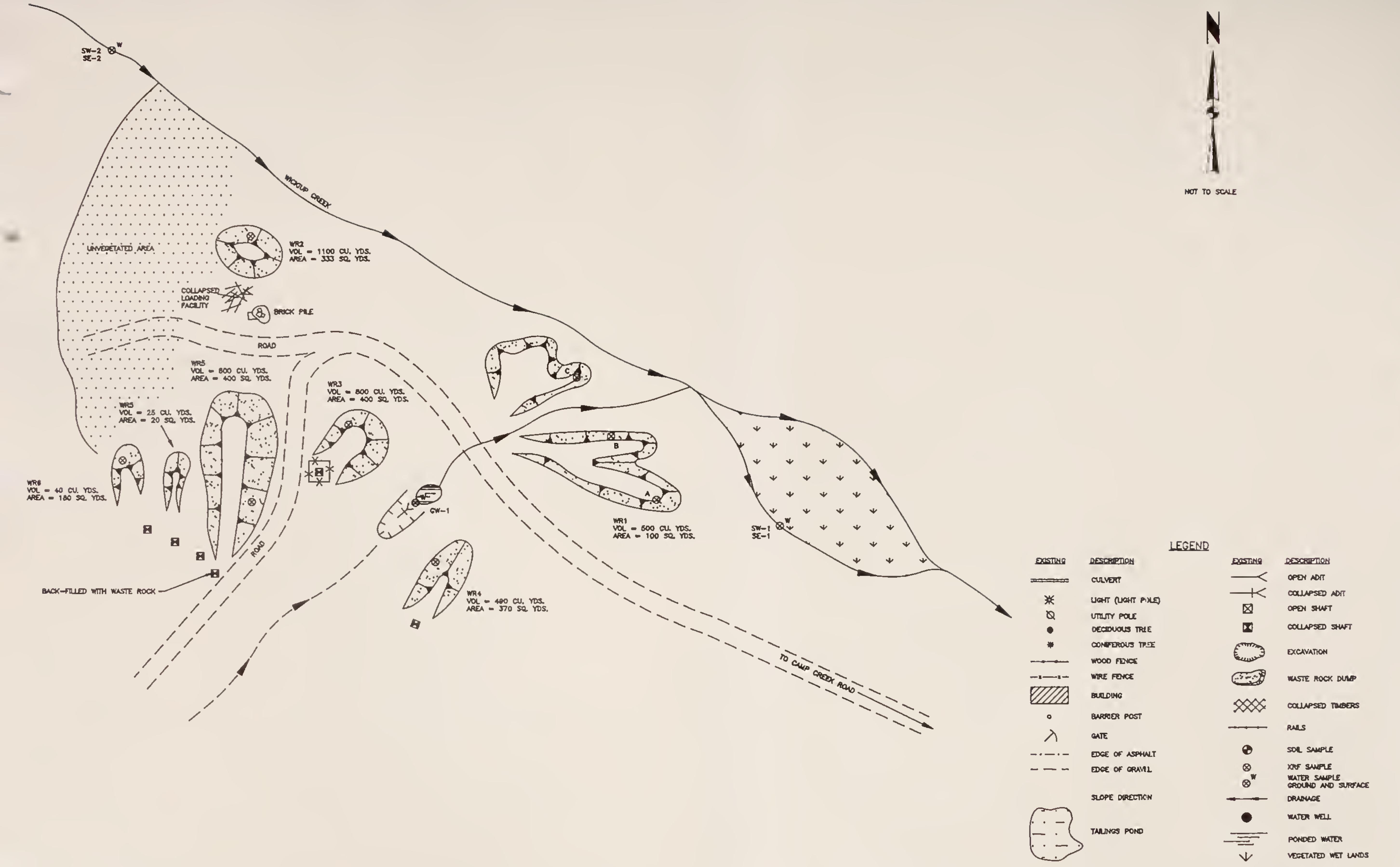
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

CLIPPER, P.A. NO. 47-029
T01S, R08W, SECTION 26
SCALE: 1" = 1000'



PLOT SCALE: 1 = 60
PT340704.DWG

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN CAJ DATE REV 1/11/95
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

TD&H
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

CLIPPER PA# 47–029
MELROSE DISTRICT SILVER BOW COUNTY

1
SHEETS

SHEET NO.
1

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	500	Lower dump in stream; south finger	None	5.0 (D)	0.05	47-029-WR-1	08/24/93 2300	T-Metals
WR-1B	WR		Lower dump in stream; second finger	None	6.0 (D)	0.035			
WR-1C	WR		Lower dump in stream; north finger	None	5.5 (D)	0.035			
WR-2	WR	1,100	North of WR-1 loadout; north side	None	< 3.5 (D)	0.05			
WR-3	WR	800	Dump from fenced shaft; northeast end	None	6.0 (D)	0.03	47-029-WR-2	08/24/93 2300	T-Metals, ABA
WR-4	WR	490	South side across WR-3; west side	None	4.0 (D)	0.03	N/A	N/A	XRF Analysis
WR-5	WR	800	Shaft above WR-2 (dozed); north end	None	6.5 (D)	0.03			
WR-6	WR	65	Northwest of WR-5; north end	None	4.9 (D)	0.05			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 47-029-WR-1 is composite of WR-1A through -1C and WR-2. 47-029-WR-2 is composite of WR-3, WR-5, and WR-6.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1

Filled shafts: Yes___, No X , Number:____ Identification:________

Seeps/Springs: Yes X , No___, Number: 1 Identification: Out of WR-1

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 1

Distance to nearest well used for drinking? > 4 miles; logged well may be a stockwater well.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Adit discharge measures good (pH and SC), but seep from dump has bad SC (940). Dumps contain elevated metals concentrations.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Tuesday

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit #1	20 gpm (E)	6.38	220	261.5	9.8	38	N/A	47-029-GW-1	08/24/93 1300	T-Metals, TDS, Hardness, Cl-, SO4, NO2/NO3
Seep	SP	Base of WR-1	N/A	N/A	940	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes_X__, No___, Name(s):_Wickiup Creek and unnamed tributary to Wickiup Creek

Dry streambeds: Yes____, No_X_, Name(s):____

Other surface water: Yes____, No_X_, Name(s)/Description:____

Waste materials within any floodplain: Yes_X__, No___ Source ID(s):_WR-1A through -1C and WR-2

Approximate Flood frequency?_X_1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)?____
High Flow:_3 cfs____, Average Flow:_1 cfs____

Distance between waste source(s) and nearest surface water body (ft)?_20 feet

Surface water draining onto or through waste sources: Yes____, No_X__,
Describe:____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, wetlands, stockwatering

Observed erosional/sedimentation/stream turbidity problems? Yes_____,
No_X__, Distance downstream (ft)?________ Describe/explain(Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):____

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downstream from mine site in Wickiup Creek	7.35	160	276.4	16.2	49	0.5 cfs (E)	47-029-SW-1	08/24/93 1345	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downstream from mine site in Wickiup Creek	N/A	N/A	N/A	N/A	N/A	N/A	47-029-SE-1	08/24/93 1345	T-Metals
SW-2	SW	Upstream from mine site in Wickiup Creek	7.53	160	344.6	15.3	49	0.43 cfs (M)	47-029-SW-2	08/24/93 1430	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Upstream from mine site in Wickiup Creek	N/A	N/A	N/A	N/A	N/A	N/A	47-029-SE-2	08/24/93 1430	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 5+ acres

Wetlands present: Yes X , No ___, Describe: Several in Wickiup Creek drainage for 2 miles

Carbonate rocks/soils: Yes ___, No X , Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 X ; 30-100 ___; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments ___

Nearest residence(ft or miles)? 1.5 miles (recreational)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX	Dry	900	900	Yes	Low
WR-2	FEOX; Low pH	Dry	3,000	3,000	Yes	Low
WR-3	FEOX	Dry	3,600	3,600	Yes	Low
WR-4	FEOX; Sulfides; pH	Dry	3,300	2,600	Yes	Low
WR-5	FEOX; Cu oxides; pH	Dry	10,800	10,800	Yes	Low
WR-6	FEOX; pH	Dry	2,700	2,700	Yes	Low

Notes and Clarifications: There is also a large area approx. two acres below WR-5 and WR-6 that is void of vegetation probably due to impacts from the mine wastes.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes___, No_X_, Describe:____

Accessibility - Fences, warning signs, closed roads? "Keep Out" signs; fence on open shaft

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes___, No_X_, Comment____

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Fenced shaft

Hazardous structures: Yes___, No_X_, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Clipper, Prepared by Northern Engineering and Testing, May 19, 1988.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Wickiup Creek, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

CLIPPER
PA NO. 47-029

Clipper PA# 47-029
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/24/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47–029–SE–1 down	44.4	20.4 J	1.1 U	18.4	6.72	1650	32400	0.030 U	85.5	13.6 J	41.8	7.26 UJ	43.7	NR
47–029–SE–2 up	10.4	29.4 J	0.8 U	5.02	8.09	12.7	17800	0.033 U	181	11.8 J	5.43 U	5.24 UJ	27.3	NR
47–029–WR–1	236	2.79 J	0.8 U	2.45	3.04	1290	27100	0.219 J	20.2	3.37 J	389	5.67 UJ	14.6	NR
47–029–WR–2	177	15.4 J	1.4	86	9.37	19100	39400	0.293 J	609	18.2 J	979	274 J	87.3	NR
BACKGROUND	56	169	0.8 JX	13.8	29.4	34.2	25300	0.014 U	462	26	30	4 UJ	119	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
47–029–WR–1	0.92	28.7	–0.3	–29	0.76	0.03	0.13	0.94	–1.23
47–029–WR–2	0.12	3.75	2.62	–1.1	0.06	<0.01	0.06	0.00	2.62

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47–029–GW–1	1.97	4.93	2.57 U	43.3	6.83 U	3050	725	0.18 JX	165	25.3	4.29 J	30.7 U	52.6 J	68.9
47–029–SW–1	2.18	8.03	2.57 U	9.7 U	10.3 J	206	291	0.45 JX	37.6	12.9	2.72 J	30.7 U	7.9 J	57.2
47–029–SW–2	2.67	7.73	2.57 U	9.7 U	6.83 U	1.55 U	102	0.16 JX	8.2	20	3.52 J	30.7 U	13.1 J	52.9

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
47–029–GW–1	131	< 5.0	40	0.11	NR
47–029–SW–1	106	< 5.0	15	< 0.05	NR
47–029–SW–2	107	< 5.0	11	< 0.05	NR

LEGEND

SE1 – Downstream from mine site in Wickiup Creek.
SE2 – Upstream from mine in Wickiup Creek.
WR1 – Composite of subsamples WR1A, 1B, 1C, and 2.
WR2 – Composite of subsamples WR3, 5, and 6.
BACKGROUND – From the Emma Mine (29–061–SS–1).
GW1 – Adit #1 discharge.
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

CLIPPER
PA NO. 47-029

Mine Name: Clipper PA# 47-029
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
47-029-WR1-A		22807.8	1320.97	1766.07	160.765 *		13682.9		143.988 *	53.5694 *	98.0123 *	23.8767
47-029-WR1-B		7954.19	1105.58	738.589			26541.1	295.401 *	625.257	72.3229 *		19.133 *
47-029-WR1-C		21179.5	2069.05	1408.32			29770		1005.92		485.749	19.9764
47-029-WR-1-COMP		10318.9	7725.66	915.858	126.276 *		37057.6		692.144		259.415	10.9002 *
47-029-WR-2		5256.78	28783.8	597.834			65819.3		1249.6	89.0716 *	268.497	14.3981 *
47-029-WR-2-COMP		9330.81	1003.28	1160.84	179.42 *	1310.09	44058.1	345.074 *	19278.6	131.305 *	130.598 *	16.7052 *
47-029-WR-3		18193.4	2391.39	1374.4			45406.1		530.003	43.3578 *	555.23	19.7656 *
47-029-WR-4		19888.2	1281.95	1680.16			29202.1		763.352	53.1321 *	166.011	21.7823
47-029-WR-5		4269.92	1062.95	669.754	161.455 *	3681.94	40885.4	551.423 *	6998.61	111.484 *	98.2713 *	
47-029-WR-6		13261.3	1135.21	1328.65	160.449 *	705.188 *	44877.2		24347	108.742 *	110.329 *	21.8412 *

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
47-029-WR1-A	258.185		9.33916 *	105.154	116.926			105.813	84.0125 *		8.68148 *
47-029-WR1-B	134.938		5.71796 *	1115.01	51.6613			56.3547 *			
47-029-WR1-C	183.47			65.3692 *	113.831			74.5446			
47-029-WR-1-COMP	133.623			266.207	75.5371			61.5197 *			13.6339 *
47-029-WR-2	81.9354			170.596	30.5937 *			23.6777 *			
47-029-WR-2-COMP	114.211			489.693	67.8245			125.621			9.03953 *
47-029-WR-3	173.871		7.66415 *	138.592	121.862			79.234	127.046 *		
47-029-WR-4	187.134		9.0153 *	38.5911 *	118.823			104.381		10.9506 *	10.8181 *
47-029-WR-5	84.3907	36.252 *		563.893	21.9213 *	158.556 *		32.126 *			
47-029-WR-6	136.307			443.388	97.1247			217.698	123.304 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

CLIPPER
PA NO. 47-029

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: CLIPPER
PA NUMBER: 47-029

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.664
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		1
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	1.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1466
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	4.416
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	13
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	43056
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.170
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	85
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.140
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.45**

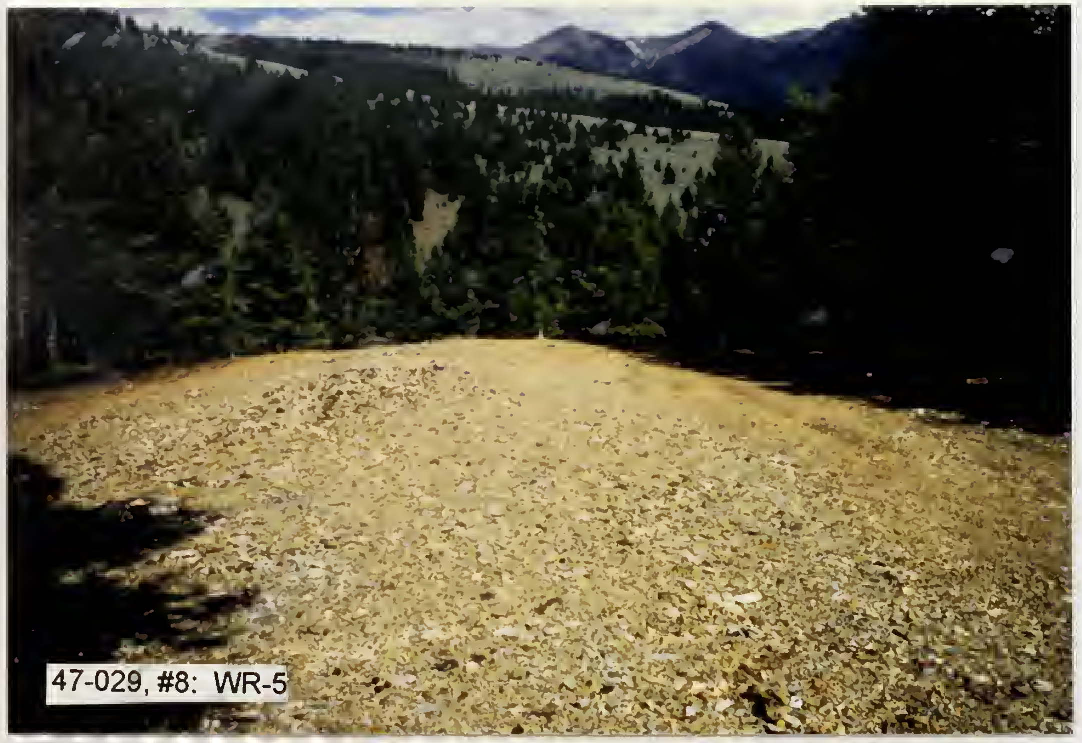
LINE NO.		SITE SAFETY		SITE NAME: CLIPPER PA NUMBER: 47-029
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	100
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

47-029, #4: Adit #1 associated with WR-1; GW-1 sample location

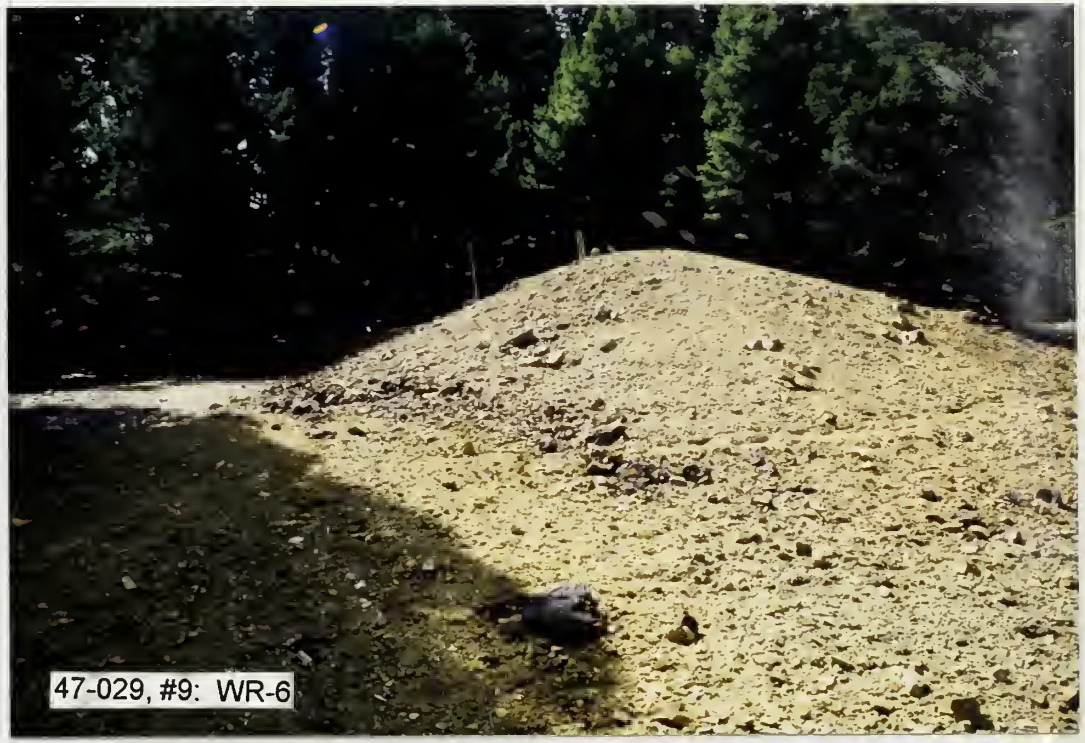
47-029, #5: WR-1

47-029, #6: SW-1 sample location

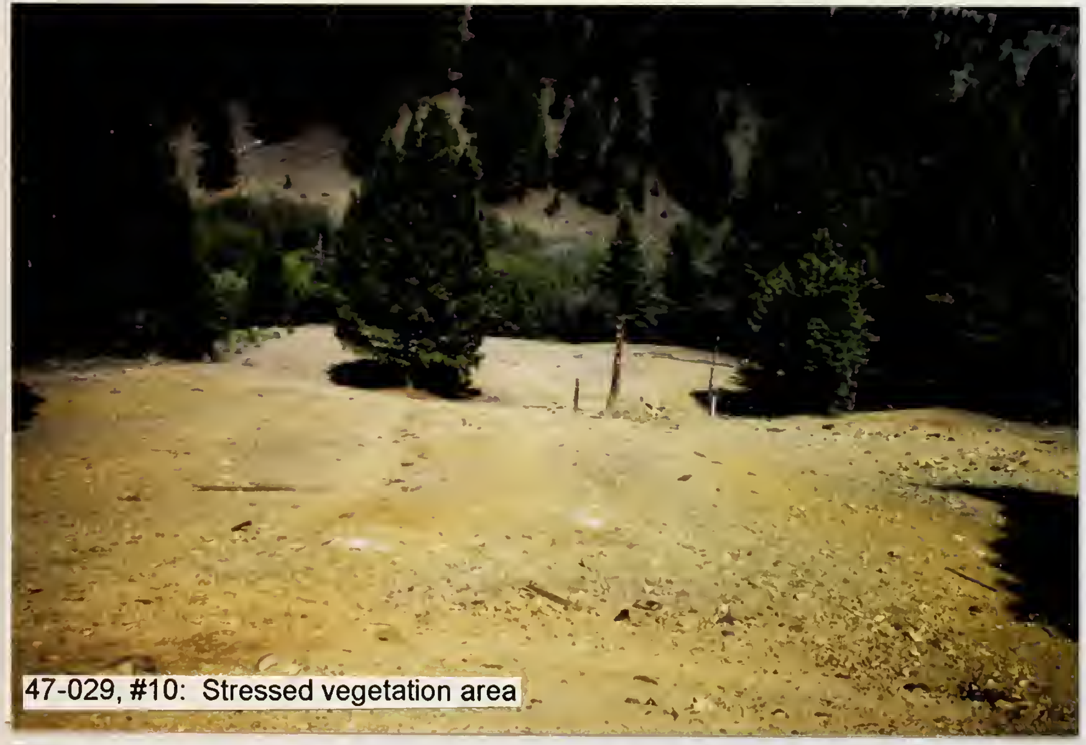
47-029, #7: WR-2



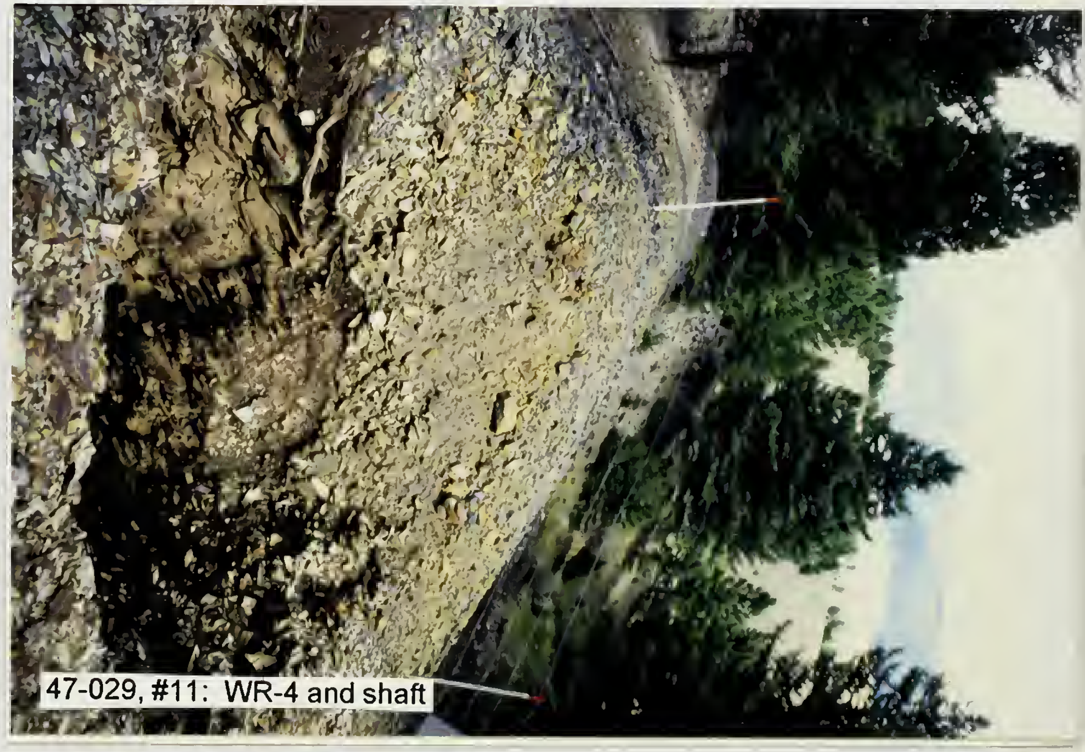
47-029, #8: WR-5



47-029, #9: WR-6



47-029, #10: Stressed vegetation area



47-029, #11: WR-4 and shaft

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MAIDEN ROCK PA#: 47-051

Date: August 24, 1993 Time: 0800-0900

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear; calm; approx. 50°F; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): No photos or video were taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): Small historic workings are present directly above the active Rhone-Poulenc phosphorous pit milling and loading facility. The workings are insignificant in comparison with the active open pit across the river and the facility. Area should be inventoried if it ceases operations. No samples were taken because of the active operation on the site.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: N/A

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MAIDEN ROCK PA#: 47-051

Legal Description: T 2S ;R 9W ;Sec. 5 ,NE 1/4NE 1/4___1/4

County: SILVER BOW Mining District: MELROSE

Latitude: N 45° 41' 42" Longitude: W 112° 44' 03"

Primary Drainage Basin and Code: Big Hole River/10020004
Secondary Drainage Basin: Big Hole River

USGS Quadrangle map name(s): Melrose

Mine Type/Commodities: Open pit/Phosphorus

Activity Status: Active X ,Inactive/Exploration___,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Deerlodge National Forest, P.O. Box 400, Butte, MT 59703.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Currently permitted facility

General site features: Elevation 5440' , Slope 0°-25° ,
Aspect North

Land use: Mining X , Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 5 acres.
Dimensions:

Predominant vegetation types: Douglas fir, sage

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Locked company gate preventing access.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is located on the east side of the Big Hole River.

Mining/milling history, ore type/tenor, host rock, gangue: No information available. Mine/quarry is currently owned and operated by Rhone Poulenc and was previously owned by Stauffer Chemical.

Mine Operation?

Shafts - Yes___, No___, # _____, Comment

Adits - Yes___, No___, # _____, Comment

Pits - Yes___, No___, # _____, Comment

Placers - Yes___, No___, # _____, Comment

Other - Yes___, No___, # _____, Comment

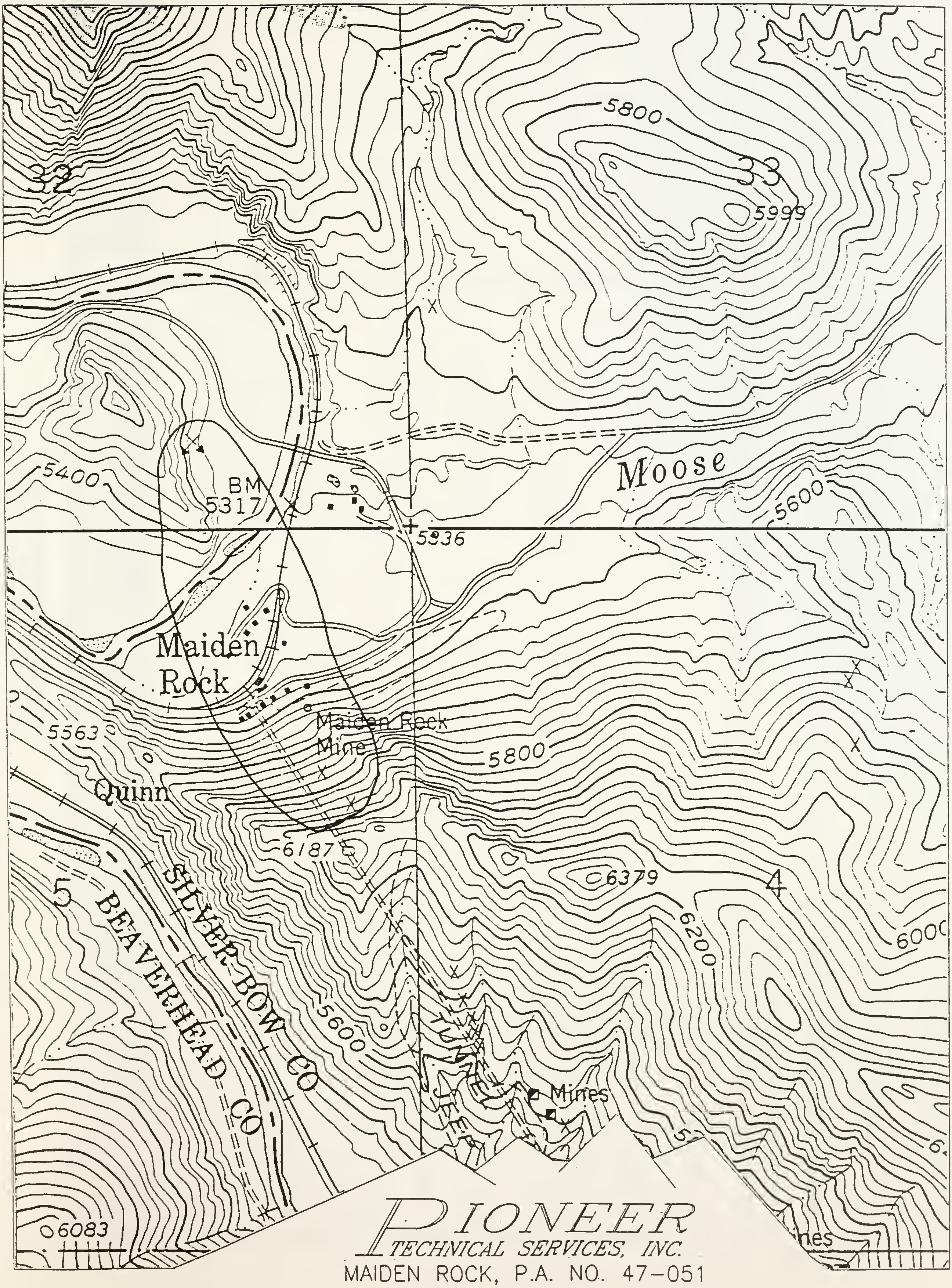
Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: Unknown to Present

Origin of Ore Milled - Custom Mill___ Dedicated Mill X; Number and names of mines that supplied mill feed:

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Possible crushing only

Well No.	Location	Depth	Yield	Static Water Level
M:107132	01S 09W 29 BA	29.0	30.0	12.00
M:107133	01S 09W 32 D	160.0	20.0	0.00
M:107134	01S 09W 32 DDD	33.0	45.0	10.00



PIONEER
TECHNICAL SERVICES, INC.

MAIDEN ROCK, P.A. NO. 47-051

T01S, R09W, SECTION 32
T02S, R09W, SECTION 05
SCALE: 1" = 1000'

SOURCE INVENTORY FORM

SAMPLERS: ______

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.									

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: ______

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 122

Distance to nearest well used for drinking? Approx. 200 yards

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Large area of disturbance

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Big Hole River

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Waste rock and the facility

Approximate Flood frequency? ___1 yr, ___10 yr, X 100 yr

Estimated seasonal flow of stream(s) (cfs)? ____
High Flow: 500 cfs , Average Flow: 50 cfs

Distance between waste source(s) and nearest surface water body (ft)? Approx. 500 feet

Surface water draining onto or through waste sources: Yes ____, No X ,
Describe: ____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, recreation, fishery, T&E - Bald Eagle, Grayling

Observed erosional/sedimentation/stream turbidity problems? Yes ____, No X , Distance downstream (ft)? ____ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): None were observed at time of investigation, but it is possible.

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 to 15 acres

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe: Abundant limestone in the area

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? < 1/4 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: ____________________

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
No samples were taken.						

Notes and Clarifications: ____________________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____, Describe: Active facility workers on the site.

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Posted signs and locked gate

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle, Peregrine
Bat Habitat - Yes_X_, No___, Comment Possible

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High_X_, Medium___, Low___
Fisheries Habitat and Species Classification - _2_
Sport Fishery Classification - _1_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2__, types and locations: Openings on hill above facility as observed from road (no actual verification).

Hazardous structures: Yes_X_, No___, Number____, types and locations: Mill complex

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:________

Fire and/or Explosion hazards: Yes___, No___, Explain: Unknown

Bibliography

MBMG, Maiden Rock, Silver Bow County, Form 39, 1966-1967, 1969 - 1970.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

USGS, Topographic Map, Melrose, Montana, 7 1/2 minute Quadrangle, 1961.

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MAIDEN ROCK
PA NO. 47-051

AIMSS SCORESHEET

SITE NAME: MAIDEN ROCK
PA NUMBER: 47-051

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
6	GW - TARGETS	WELLS - 1 MI. x 2.5		7.5
7		WELLS - 1 TO 4 MI		119
8		NEAREST WELL		10
9		TARGETS SCORE	LINES 6 + 7 + 8	136.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		10
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	22
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	10
27		LIKELIHOOD SCORE	LINES 25 + 26C	10
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	50
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			0.00

SITE NAME: MAIDEN ROCK
PA NUMBER: 47-051

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	140
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**4.20**

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MIDDLE FORK MILLSITE PA#: 47-081

Date: August 27, 1993 Time: 0800-1600

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer

Visitors: Darla Haberman, Pioneer

Weather/Seasonality Observations: Sunny and clear; slight breeze; warm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: SW-3 sample location upgradient Moose Creek; #33: Millsite; #34: TP-1; #35: TP-2; #36: Barrels and TP-4; #37: TP-3. Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate Moose Creek channel from waste material. Fence tailings to keep cattle off slopes and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MIDDLE FORK MILLSITE PA#: 47-081

Legal Description: T 1N ;R 8W ;Sec. 36 , SW1/4 SE1/4 ___1/4

County: SILVER BOW Mining District: MOOSE CREEK

Latitude: N 46° 47' 15" Longitude: W 112° 33' 10"

Primary Drainage Basin and Code: Moose Creek/10020004
Secondary Drainage Basin: Middle Fork Moose Creek

USGS Quadrangle map name(s): Mount Humbug

Mine Type/Commodities: Mill tailings/Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Deerlodge National Forest, P.O. Box 400, Butte, MT 59703.

Relationship to other mines/sites in the area/district: Ore milled came from the Highland mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7000' , Slope 3°-10° , Aspect Southwest

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 11 acres.
Dimensions: Approx. 1,350 feet x 350 feet

Predominant vegetation types: Lodgepole pine, aspen, sage brush, rabbit brush, blue bunch wheat grass

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in the drainage of the Middle Fork Moose Creek. The intermittent creek flows south through the site to confluence with Moose Creek approx 1.5 miles away.

Mining/milling history, ore type/tenor, host rock, gangue: The mill received ore from the Highland properties of the Fish Creek district. The mill was originally built in the Basin Creek drainage, but moved to the Moose Creek drainage prior to operation due to concerns for Butte's water supply. The mill was constructed and operated by the Butte Highlands Mining Company.

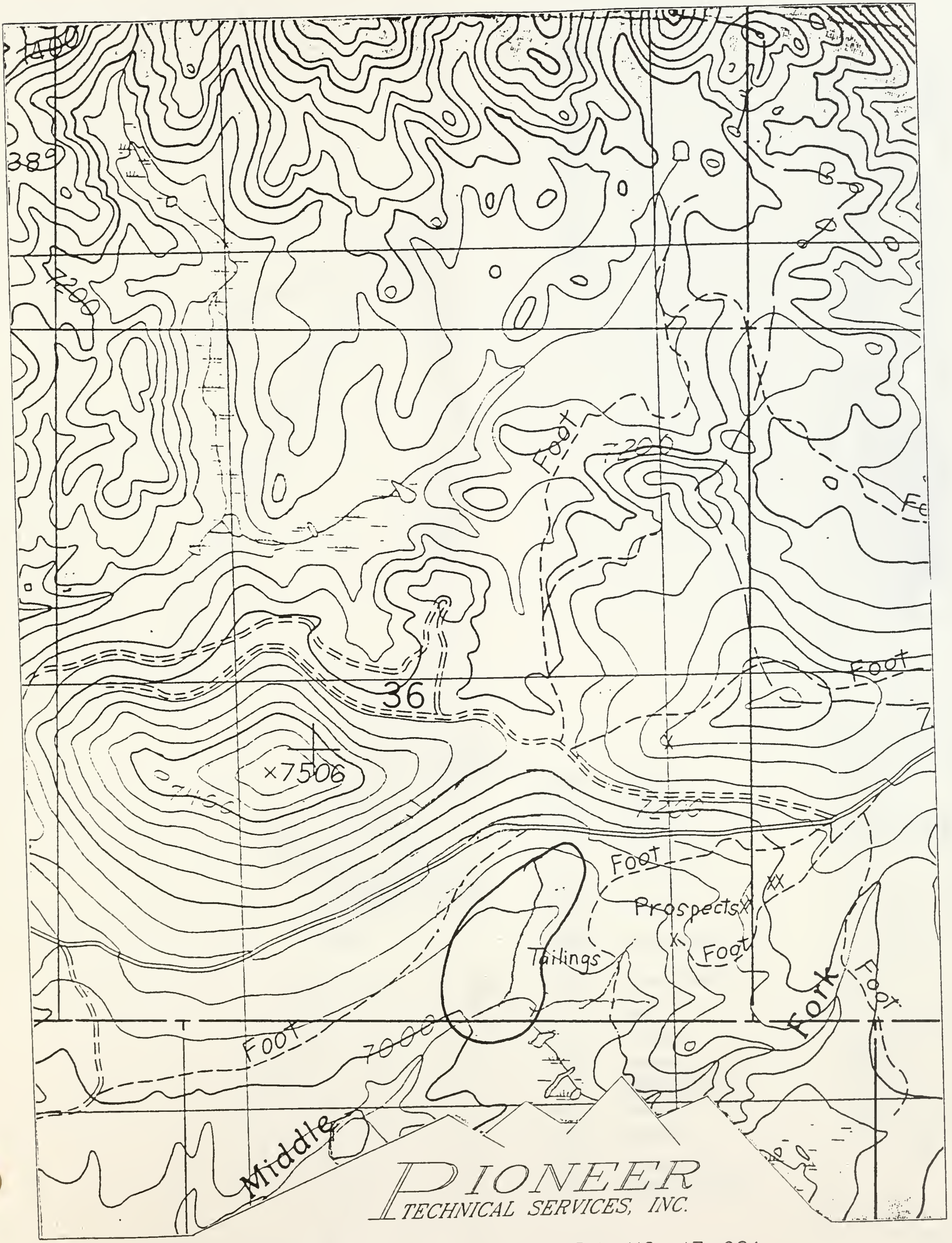
Mine Operation?
Shafts - Yes___, No X, # ____, Comment
Adits - Yes___, No X, # ____, Comment
Pits - Yes___, No X, # ____, Comment
Placers - Yes___, No X, # ____, Comment
Other - Yes___, No X, # ____, Comment

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: Mid-1930's to 1942

Origin of Ore Milled - Custom Mill X Dedicated Mill___; Number and names of mines that supplied mill feed: Highland properties included the Murphy Ore Shoot, Only Chance, and Tilton (Diamond T).

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
Cyanide vat leach (100 ton)

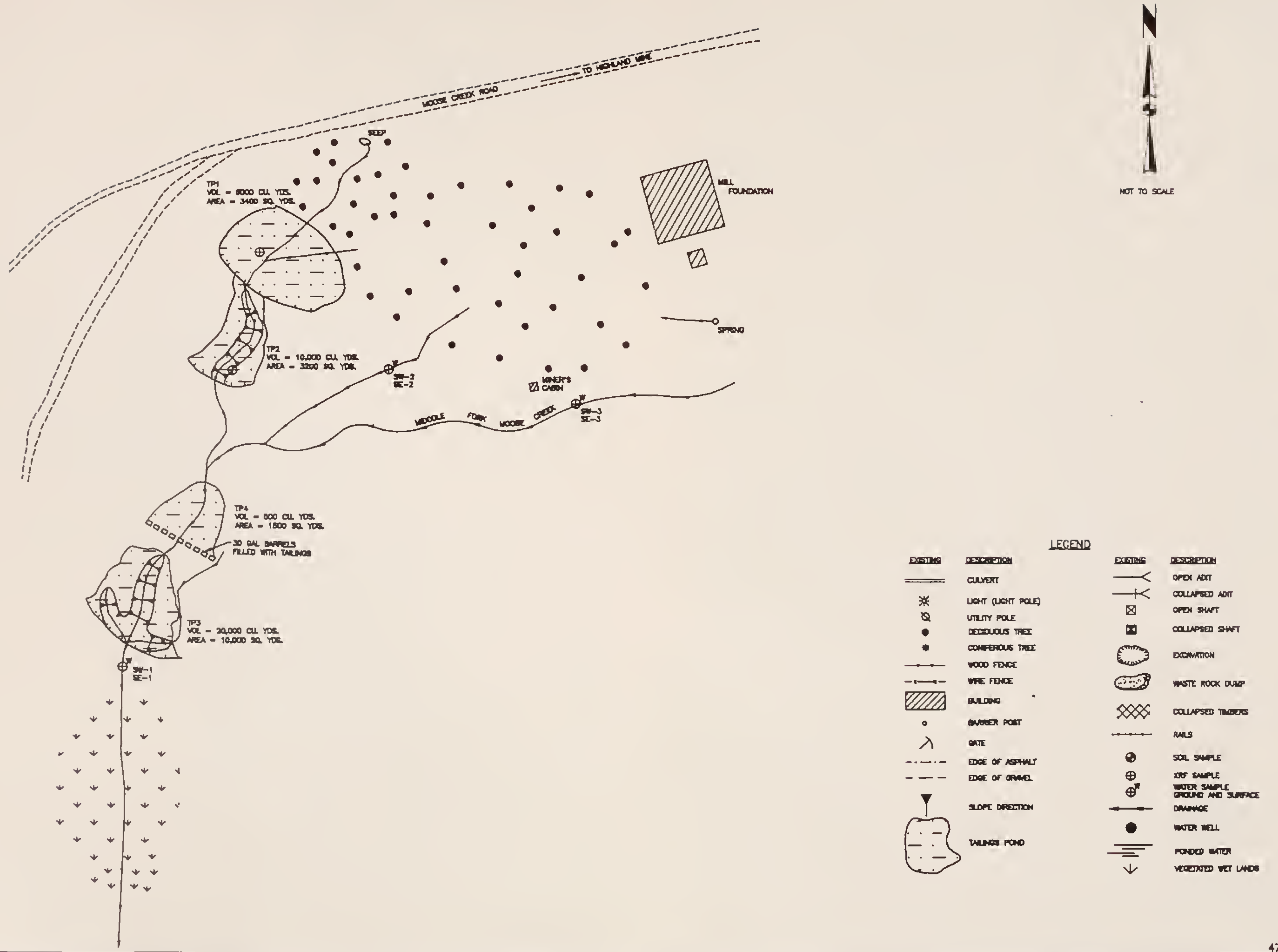


PIONEER
TECHNICAL SERVICES, INC.

MIDDLE FORK TAILINGS, P.A. NO. 47-081

T01N, R08W, SECTION 36

SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MIDDLE FORK MILLSITE PA# 47-081
MOOSE CREEK SILVER BOW COUNTY

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

DRAWN CAJ DATE 11/23/93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

SHEET NO.

47-081.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): 60% fine to medium sand and 40% silt and clay

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Tailings are mostly oxidized with a small reduced zone in TP-3.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Surface is mostly dry and lower zones are wet.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): Impoundments have all been breached.

Comments on potential for mitigation: Vegetation is volunteering well on the tailings, but cattle grazing is impacting the natural vegetation process.

SOURCE INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	6,000	Western end of upper pond; 0-2', orange sand	Breached Impoundment	4.9 (D)	0.03	47-081-TP-1	08/27/93 1730	T-Metals, ABA
TP-1A-B	TAIL		Western end of upper pond; 2-3.5', brown sand	Breached Impoundment	4.3 (D)	0.035			
TP-1A-C	TAIL		Western end of upper pond; 3.5'-9', orange/brown silty sand	Breached Impoundment	4.9 (D)	0.035			
TP-2A-A	TAIL	10,000	Center pond profile, east side of box culvert; 0-3', orange fine sand	Breached Impoundment	6.0 (D)	0.03			
TP-2A-B	TAIL		Center pond profile, east side of box culvert; 3-8', orange/brown silty sand	Breached Impoundment	4.8 (D)	0.035			
TP-2A-C	TAIL		Center pond profile, east side of box culvert; 13-15', orange/brown sandy silt	Breached Impoundment	4.4 (D)	0.03			
TP-3A-A	TAIL	20,000	Borehole in center of lowest pond; 0-1.5', orange fine sand	Breached Impoundment	3.5 (D)	0.04	47-081-TP-2	08/27/93 1730	T-Metals, ABA
TP-3A-B	TAIL		Borehole in center of lowest pond; 1.5-5.5', brown sand silt	Breached Impoundment	< 3.5 (D)	0.05			
TP-3B-A	TAIL		Profile in lower pond near dam; 0-2', orange fine silty sand	Breached Impoundment	4.6 (D)	0.03			
TP-3B-B	TAIL		Profile in lower pond near dam; 6-7', gray/brown clay	Breached Impoundment	5.9 (D)	0.03			
TP-4	TAIL	500	Composite from 30 gallon buckets between TP-2 and TP-3	Breached Impoundment	< 3.5 (D)	0.05			

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 47-081-TP-1 is composite of TP-1 and TP-2 samples. 47-081-TP-2 is composite of TP-3 and TP-4 samples.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes X , No___, Number: 2 Identification: One above TP-1 and another above SW-2 sample location

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 30

Distance to nearest well used for drinking? Approx. 3.5 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Tailings are wide spread throughout a high mountain meadow with former wetlands and shallow alluvial groundwater.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Middle Fork Moose Creek

Dry streambeds: Yes X, No ___, Name(s): Several small tributaries

Other surface water: Yes ___, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No ___ Source ID(s):

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?
High Flow: 10-20 cfs, Average Flow: 2.5 cfs

Distance between waste source(s) and nearest surface water body (ft)?
0 feet

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Tributary water drains through the tailings.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agriculture, stock watering; fishery

Observed erosional/sedimentation/stream turbidity problems? Yes X,
No ___, Distance downstream (ft)? 1200+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings are eroding downhill.

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Downstream below lowest tailings pond	8.07	510	NM	NM	240	3 cfs (E)	47-081-SW-1	08/27/93 1200	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Downstream below lowest tailings pond	N/A	N/A	N/A	N/A	N/A	N/A	47-081-SE-1	08/27/93 1200	T-Metals
SW-2	SW	Intermediate sample on tributary between mill and tailings	7.25	430	NM	NM	168	0.2 cfs (E)	47-081-SW-2	08/27/93 1330	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Intermediate sample on tributary between mill and tailings	N/A	N/A	N/A	N/A	N/A	N/A	47-081-SE-2	08/27/93 1330	T-Metals
SW-3	SW	Upgradient on Middle Fork Moose Creek	7.25	430	NM	NM	217	2.5 cfs (E)	47-081-SW-3	08/27/93 1500	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	Upgradient on Middle Fork Moose Creek	N/A	N/A	N/A	N/A	N/A	N/A	47-081-SE-3	08/27/93 1500	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 50 to 100 acres

Wetlands present: Yes X, No ___, Describe: Minimal wetlands present within the tailings; extensive wetlands downstream of site.

Carbonate rocks/soils: Yes ___, No X, Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X; 10-30 ___; 30-100 ___; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments ___

Nearest residence(ft or miles)? Approx. 3.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Tuesday

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	Low pH	Partial	30,600	12,240	Yes	Low
TP-2	Low pH	Partial	28,800	5,760	Yes	Low
TP-3	Low pH; FEOX; SO3	Partial	90,000	18,000	Yes	Low
TP-4	Low pH	Partial	13,500	1,350	Yes	None

Notes and Clarifications: ______________________________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments_None_______________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_Off-road vehicle tracks, litter_______________

Accessibility - Fences, warning signs, closed roads?_Unrestricted___

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes___, No_X_, Comment__________
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_Not Rated_
Wetlands Frontage - High___, Medium___, Low_Not Rated_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _3_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes_X_, No___, Number____, types and locations:_Some remains of the old mill are mostly collapsed._

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number____, types and locations:_Tailings impoundments are breached._

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

Bibliography

MBMG, Geology and Ore Deposits of the Highland Mountains, Southwest Montana, Memoir 32, Written by U.M. Sahinen, 1950.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Middle Fork Millsite, Prepared by Northern Engineering and Testing, October 4, 1978.

USGS, Topographic Map, Mount Humbug, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

MIDDLE FORK MILLSITE
PA NO. 47-081

Middle Fork Millsite PA# 47-081
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/27/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
47-081-SE-1	418 J	204	2.59 J	27.8	14.3	993	127000	0.546 J	6420	20	109	14.8 U	249	NR
47-081-SE-2	1080 J	259	9.08 J	19.1	7.27 U	393	221000	0.805 J	2070	13.5	75.1	36.9 U	635	NR
47-081-SE-3	12.5 J	96.3	0.99 U	5.56	7.05	14.5	8490	0.126 J	349	8.54	7.05 U	6.8 U	24.1	NR
47-081-TP-1	261 J	29.5	1.52 J	6.68	15.5	783	70700	0.93 J	213	5.73	62	7.16	155	NR
47-081-TP-2	265 J	40	2.47 J	13.5	10.7	1120	106000	0.705 J	432	7.99	195	7.71 U	241	NR
BACKGROUND	40.1 J	173 J	1 U	10.1	21.1 J	34.3	18500 JX	0.039 J	832	18.1	14.8	7.28 UJ	61.9 J	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
47-081-TP-1	1.15	35.9	98.3	62.4	0.78	0.27	0.1	8.43	89.9
47-081-TP-2	3	93.7	56.4	-37.	<0.01	2.83	0.37	88.4	-32

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
47-081-SW-1	4.15	30	4.59 U	5 U	6.24 U	9.23 J	467 J	0.21	49.9	10.9 U	2.1	31.7 U	8.71 U	295
47-081-SW-2	3.03	24.5	4.59 U	5 U	6.24 U	5.73 J	371 J	0.21	27.6	10.9 U	0.94 U	31.7 U	8.71 U	209
47-081-SW-3	3.53	37.9	4.59 U	5 U	6.24 U	10.6 J	46.7 J	0.19	30.9	10.9 U	0.94 U	31.7 U	8.71 U	219

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
47-081-SW-1	329	< 5.0	57	< 0.05	NR
47-081-SW-2	285	< 5.0	52	< 0.05	NR
47-081-SW-3	272	< 5.0	7	< 0.05	NR

LEGEND

SE1 – Downstream below lowest tailings pond.
SE2 – Intermediate sample on tributary between mill and tailings.
SE3 – Upgradient on Middle Fork Moose Creek.
TP1 – Composite of subsamples Tp1, 2A-A, 2A-B, and 2A-C.
TP2 – Composite of subsamples TP3A-A, 3A-B, and 4.
BACKGROUND – From the Highland Mine (47-028-SS-1).

SW1 – Same as sample SE1.
SW2 – Same as sample SE2.
SW3 – Same as sample SE3.

XRF ANALYSIS RESULTS

MIDDLE FORK MILLSITE
PA NO. 47-081

Mine Name: Middle Fork Millsite PA# 47–081
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
47–081–SE–2		605.685 *	8560.4	653.462		769.259 *	151419	884.481 *	734.582	230.595	563.783	15.2058 *
47–081–TP1A–A		1784.82	13650.4	696.188			201645	921.973 *	916.019	120.836 *	626.334	
47–081–TP1A–B		1469.12	32621.1	443.366 *			190061	1008.78 *	1761.35	249.017	393.892	16.799 *
47–081–TP1A–C		821.383 *	21434.8	1194.57			116610	828.307 *	818.57	167.491 *	820.272	10.2877 *
47–081–TP2A–A		1492.41	20835.6	565.056			125335		592.903	142.025 *	622.742	
47–081–TP2A–B			45326.8	540.001			57225		294.176	57.1217 *	510.359	12.8999 *
47–081–TP2A–C		1020.17 *	63373.3	2508.37			95789.6	654.809 *	641.653	340.217	579.084	30.4257
47–081–TP3A–A		5233.76	27347.5	952.301		885.151 *	187504	1307.54 *	1233.84	222.282 *	441.791	17.3764 *
47–081–TP3A–A–DUP		4827.89	27113.1	848.354		657.72 *	183643	754.11 *	1311.73	177.797 *	488.781	15.8318 *
47–081–TP3A–B		822.532 *	33372.9	844.317		504.133 *	164417	760.017 *	1116.8	257.101	595.671	8.76781 *
47–081–TP3B–A		2200.68	28669.2	633.148		930.76 *	183309	699.573 *	1231.63	203.244 *	571.795	17.2903 *
47–081–TP3B–B		968.266 *	25636.4	976.924		504.936 *	169524	1455.45 *	1372.46	320.247	460.174	
47–081–TP–1–COMP		1621.69	29946.1	999.018			143792	1036.54 *	953.223	212.22	733.965	12.8334 *
47–081–TP–2–COMP		2580.24	23112.2	830.818		752.407 *	181828	1163.74 *	1222.04	267.245	584.859	9.67624 *
47–081–TP–4		2529.32	13013.5	1533.45			208398	877.175 *	1171.15	474.224	627.73	13.2165 *

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
47–081–SE–2	28.3959			91.4286 *							
47–081–TP1A–A	30.071	111.081 *	7.00127 *	111.409 *							7.97656 *
47–081–TP1A–B	19.9828		11.5943 *	52.6961 *			90.2896 *				
47–081–TP1A–C	40.1065		11.0042 *	25.0714 *			193.716 *				12.9327 *
47–081–TP2A–A	27.1918		6.37298 *	40.066 *			84.5174 *				4.38855 *
47–081–TP2A–B	34.3554						129.294 *	38.6073 *			9.04863 *
47–081–TP2A–C	102.7	50.1569 *				220.26 *	104.141 *	28.1283 *	139.436 *	7.08532 *	20.1104
47–081–TP3A–A	42.3702	65.371 *		248.012	21.6428 *	270.734 *		30.3273 *			5.5537 *
47–081–TP3A–A–DUP	40.0003			242.044							
47–081–TP3A–B	31.9434			108.995							6.69158 *
47–081–TP3B–A	28.8637		6.32883 *	100.68 *					223.685 *		
47–081–TP3B–B	28.1007			210.19							5.498 *
47–081–TP–1–COMP	42.3365	58.3059 *	8.96052 *	45.0318 *			137.695 *				8.58486 *
47–081–TP–2–COMP	34.7764	60.6146 *		144.697							5.00759 *
47–081–TP–4	52.7355		16.8856 *	268.805		280.915 *	158.696 *	41.9101 *			8.62668 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MIDDLE FORK MILLSITE
PA NO. 47-081

AIMSS SCORESHEET

SITE NAME: MIDDLE FORK MILLSITE
PA NUMBER: 47-081

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.773
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		30
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	30.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	81276
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	8.606
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	19
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	114460
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.086
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	1
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	4
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.068
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	20
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**1.96**

SITE NAME: MIDDLE FORK MILLSITE
PA NUMBER: 47-081

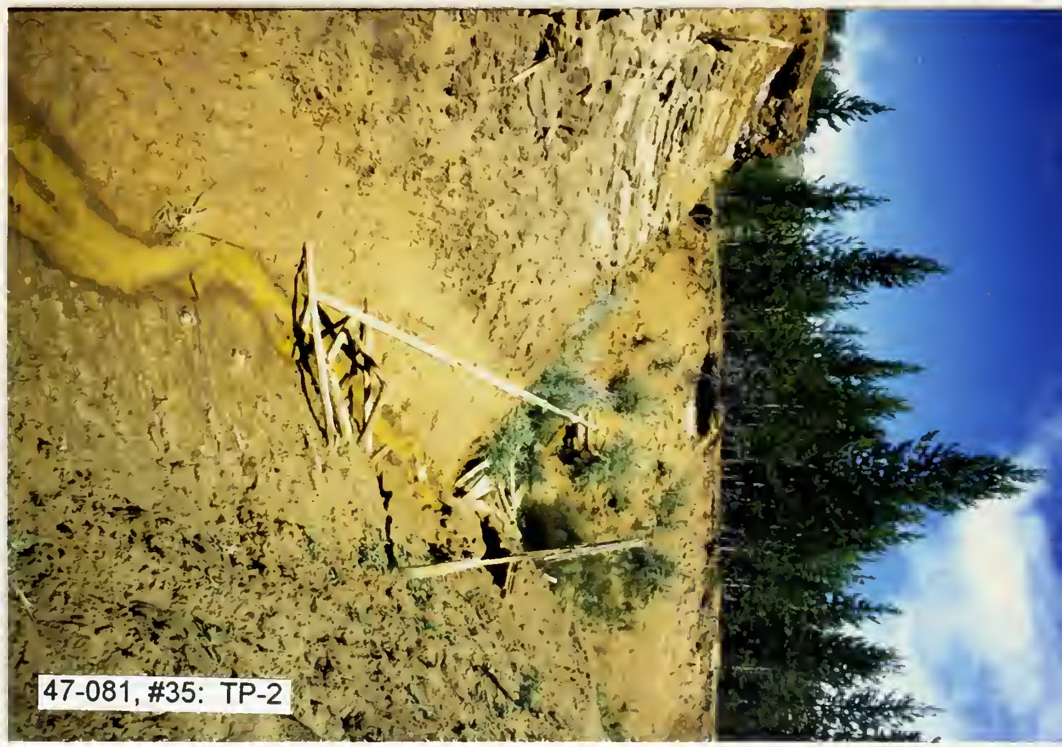
SITE SAFETY

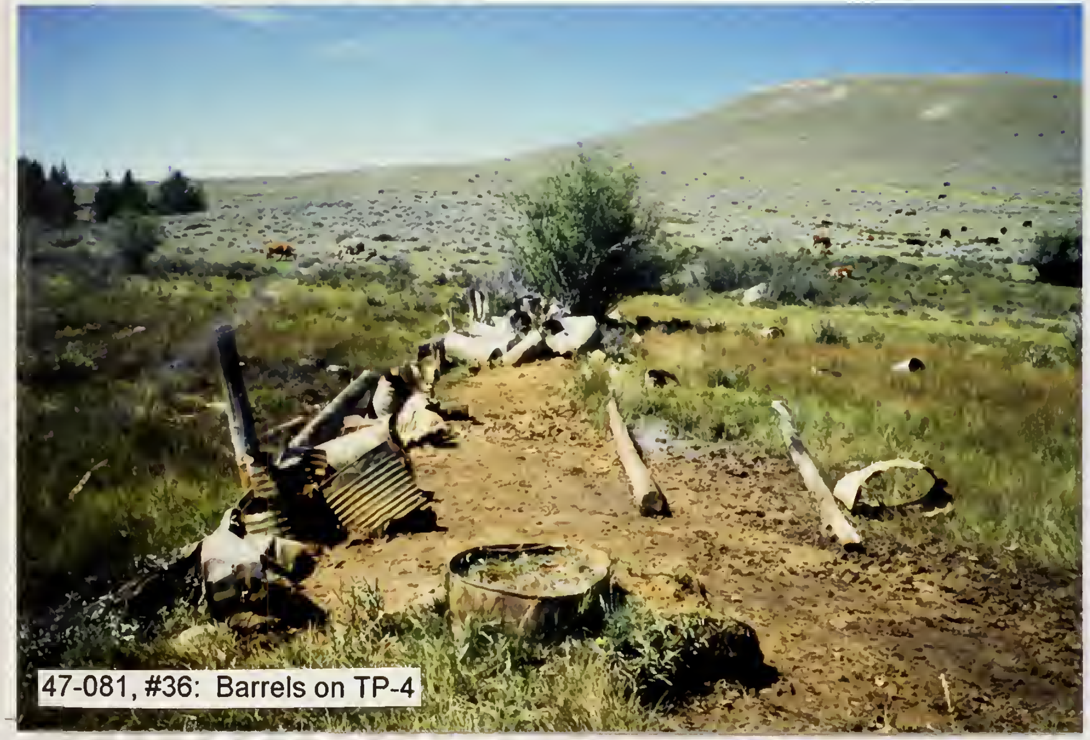
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	40
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**1.60**

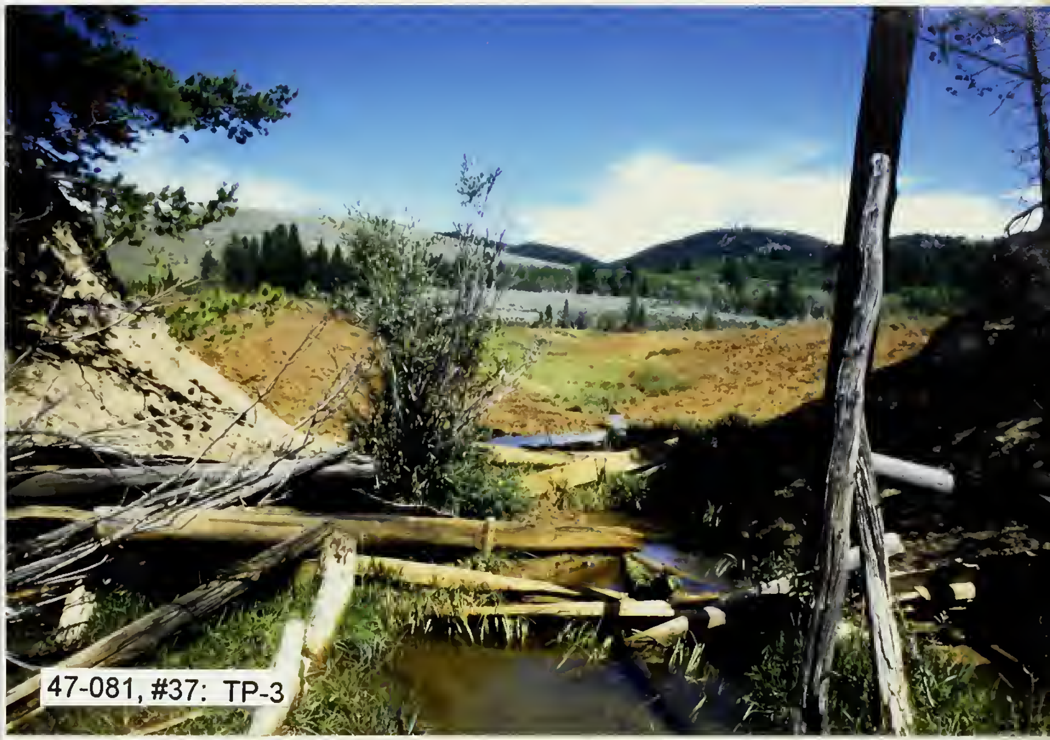
47-081, #1: SW-3 sample location upgradient at the Middle Fork Millsite

47-081, #33: Millsite

47-081, #34: TP-1


47-081, #35: TP-2


47-081, #36: Barrels on TP-4


47-081, #37: TP-3

STILLWATER

NYE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: MOUAT MINE **PA#:** 48-001

Date: August 24, 1993 **Time:** 0910

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Pierson, TD&H

Visitors: Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Warm (75°F); partly cloudy; slight breeze (0-3 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17-#18: Panorama of WR-3, WR-4, and WR-5 from south to north; #19: Adit #2 with discharge; #20: WR-1 and manway; #21: WR-2 and collapsed elevated railway; #22: Town and Mountain View Lake, facing east from WR-2. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is in two separate areas on either side of a ridge.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Potential for reprocessing waste rock for chrome content; otherwise, recontour, amend, and seed. Adit discharge does not carry elevated metals nor have a low pH.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): MOUAT MINE PA#: 48-001

Legal Description: T 5S ;R 15E ;Sec. 20 , NW1/4 __1/4 __1/4

County: STILLWATER Mining District: NYE

Latitude: N 45° 23' 20" Longitude: W 109° 54' 03"

Primary Drainage Basin and Code: Stillwater River/10070005
Secondary Drainage Basin: Mountain View Creek

USGS Quadrangle map name(s): Meyer Mountain

Mine Type/Commodities: Hardrock/Chromium

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact (Include address and phone when available): Custer National Forest, P.O. Box 2556, Billings, MT 59103; Manville Sales Corp., Box 477, Absarokee, MT 59001; William Mouat, 825 Park Hill Drive, Billings, MT 59102. (406) 248-7831.

Relationship to other mines/sites in the area/district: Another chrome mine, Benbow, is located to the southwest. The Mouat Mill is located one mile to the east.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7200'-7600', Slope Very steep , Aspect East

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 6.6 acres.
Dimensions:

Predominant vegetation types: Pine, grasses, brush

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Locked gates when crossing Stillwater Mining site.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is in the Mountain View Lake drainage. Mountain View Lake is approx. 700 feet downgradient from WR-2. Two perennial or intermittent drainages are 600 feet to the north of the site. Deposits associated with piokilitic harzburgite.

Mining/milling history, ore type/tenor, host rock, gangue: Deposits were examined in 1939 and development began in 1941. Operations ceased in 1943. Average Cr2O3 content was 21.64% and 183,200 tones of ore was mixed.

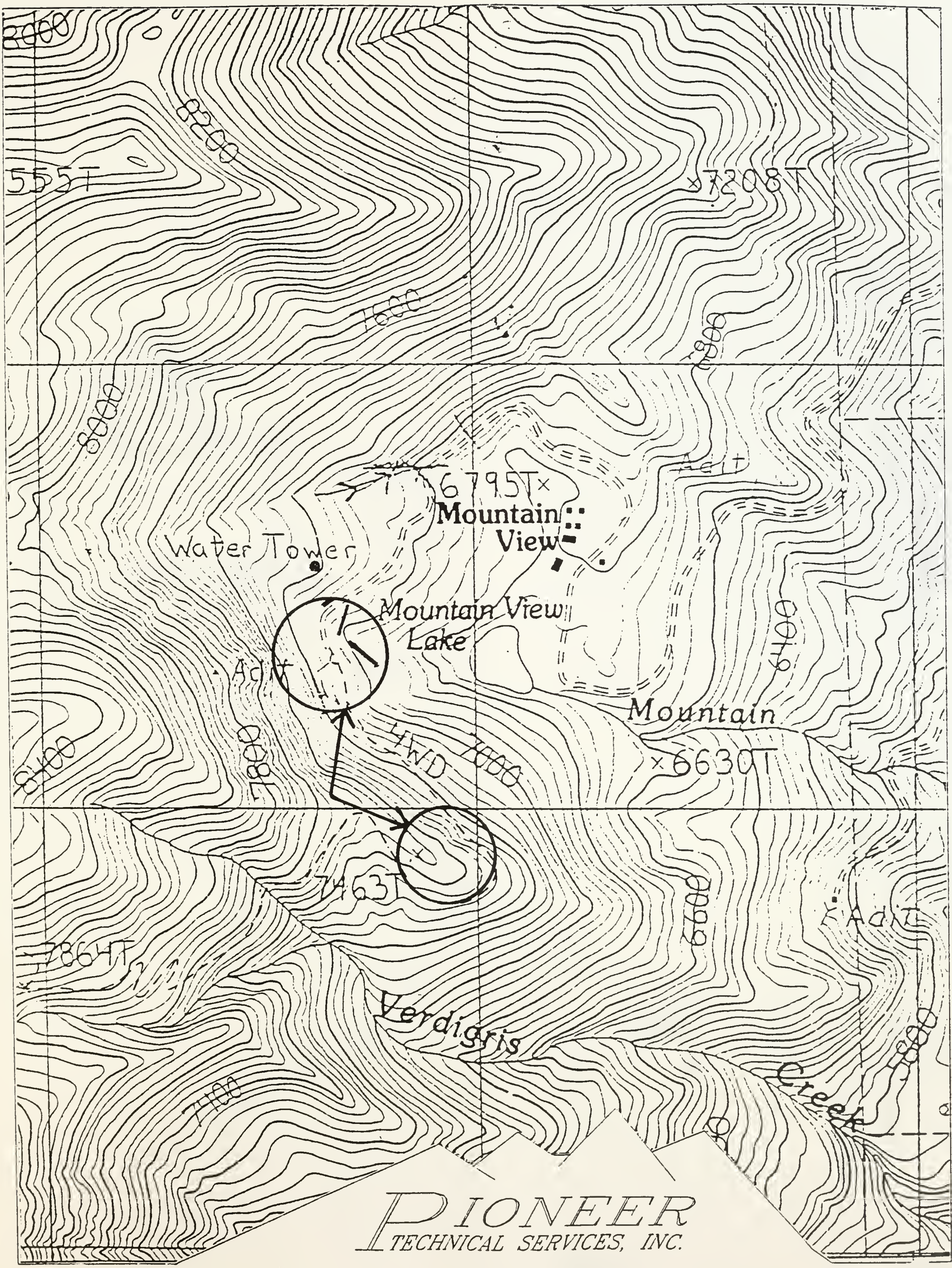
Mine Operation?
Shafts - Yes X, No ___, # 1, Comment Caved stope or shaft
Adits - Yes X, No ___, # 6, Comment 2 open; 4 caved; 1 (WR-2) with door
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

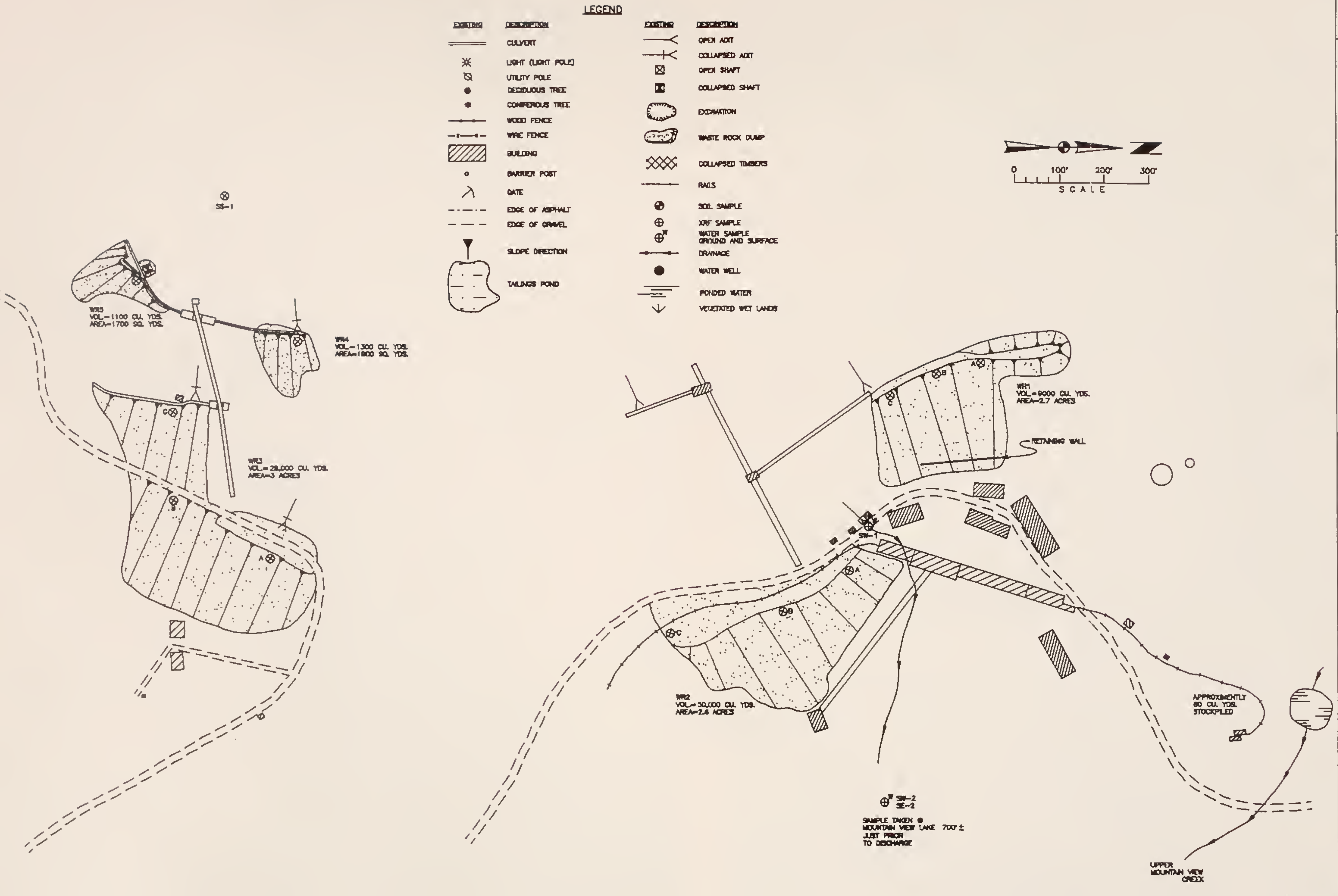


PIONEER
TECHNICAL SERVICES, INC.

MOUAT MINE, P.A. NO. 48-001

T05S, R15E, SECTION 20

SCALE: 1' = 1000'



DRAWN JTP DATE 24 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER
TECHNICAL SERVICES INC. BUTTE, MT.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

MOUAT PA# 48-001
NYE DISTRICT STILLWATER COUNTY

SHEET NO.

48-001.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	9,000	Area 1; north end of dump, below pile of timbers	None	6.8 (D)	0.025	48-001-WR-1	08/24/93 2000	T-Metals, ABA
WR-1B	WR		Area 1; near top center of pile, below wood box	None	6.8 (D)	0.02	48-001-WR-2	08/24/93 20005	T-Metals, ABA
WR-1C	WR		Area 1; 25 feet north of Adit #1, near top	None	7.0 (D)	0.02			
WR-2A	WR	50,000	Area 1; north side of pile	None	7.0 (D)	0.03			
WR-2B	WR		Area 1; middle of pile	None	7.0 (D)	0.04			
WR-2C	WR		Area 1; south side of pile	None	7.0 (D)	0.03			
WR-3A	WR	29,000	Area 2; north side of lower pile	None	7.0 (D)	0.02	48-001-WR-3	08/24/93 2010	T-Metals, ABA
WR-3B	WR		Area 2; south side of lower pile	None	7.0 (D)	0.03			
WR-3C	WR		Area 2; middle of upper pile	None	7.0 (D)	0.03			
WR-4	WR	1,300	Area 2; 20 feet west of collapsed adit, approx. 5 feet off top	None	7.2 (D)	0.03			
WR-5	WR	1,100	Area 2; just below collapsed shaft	None	7.0 (D)	0.04			
SS-1	BKGRND	N/A	Background soil 300 feet above WR-4	N/A	6.8 (D)	0.02	48-001-SS-1	08/24/93 1305	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 48-001-WR-1 is composite of WR-1A and WR-2C. 48-001-WR-2 is composite of WR-1B and -1C, and WR-2A and -2B. 48-001-WR-3 is composite of WR-3A through -3C, WR-4, and WR-5.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: At WR-2

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes X , No____, Number: 2 Identification: 600 feet north of the site

Groundwater wells within 4 miles?: Yes___, No X ;
Number of well logs: 0

Distance to nearest well used for drinking? 5 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Depth to groundwater is approx. 30 feet; however, adit discharge is not a large volume and does not contain elevated metals. Data previously collected does not indicate contamination.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	AD	Adit discharge at WR-2	35 gpm (M)	8.05	174	164	4.2	113	N/A	48-001-SW-1	08/24/93 1145	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):____

Dry streambeds: Yes____, No_X_, Name(s):____

Other surface water: Yes_X_, No___, Name(s)/Description: Mountain View Lake

Waste materials within any floodplain: Yes____, No_X_ Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?_
700 feet from WR-2 to Mountain View Lake

Surface water draining onto or through waste sources: Yes____, No_X_,
Describe:____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, irrigation, wetland, agriculture, possible residential

Observed erosional/sedimentation/stream turbidity problems? Yes_____,
No_X_, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-2	SW	Mountain View Lake just prior to discharge	8.8	137	237	18.8	90	150 gpm (M)	48-001-SW-2	08/24/93 1310	T-Metals, TDS, Hardness, Cl, SO4
SE-2	SE	Mountain View Lake just prior to discharge	N/A	N/A	N/A	N/A	N/A	N/A	48-001-SE-2	08/24/93 1310	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No NO2/NO3 analyses were requested for SW-2.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 15 acres

Wetlands present: Yes X , No ___, Describe: Around Mountain View Lake and Mountain View Creek

Carbonate rocks/soils: Yes X , No ___, Describe: Limestone was observed on the road between sites.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 ___; 30-100 X ; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments

Nearest residence(ft or miles)? 5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	117,612	111,731	Yes	Moderate
WR-2	None	Dry	113,256	113,256	Yes	Moderate
WR-3	None	Dry	130,680	130,680	Yes	Moderate
WR-4	None	Dry	17,100	17,100	Yes	Moderate
WR-5	None	Dry	15,300	15,300	Yes	Moderate
Adit #2	None	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes_X_, No____, Describe: Campfire pit, cache box

Accessibility - Fences, warning signs, closed roads? Locked gates when crossing Stillwater Mining Company property

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes_X_, No___, Comment Open adit

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit at WR-1

Hazardous structures: Yes_X_, No___, Number_12_, types and locations: At least twelve very large standing structures

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_, types and locations: Retaining wall

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_5_, types and locations: All waste rock piles are steep, unvegetated, and prone to sliding under foot.

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Wood buildings

Bibliography

CDM, Stillwater Chromite Project Phase I Data Report Hydrology and Wildlife Monitoring, 1989.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands Portal Inventory Form for Mouat Mine, Prepared by Daphne Digrindakis, September 1, 1983.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Mouat (Mountain View), Prepared by Spectrum Engineering, January 29, 1989.

Spectrum Engineering, An Environmental Assessment of the Reclamation of Hazardous Openings and Structures at the Mouat Mine, Stillwater County, Montana, 1989.

USGS, Topographic Map, Meyer Mountain, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

MOUAT MINE
PA NO. 48-001

Mouat Mine PA# 48-001
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 08/24/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
48-001-SE-2	4.29 U	7.79 J	0.8 U	11	82.6	18.5	10900	0.028 U	105	123 J	5.89 U	5.68 UJ	15.7	NR
48-001-WR-1	4.42 U	3.22 J	1.1	80.5	51.8	22.8	46600	0.25 J	696	943 J	6.06 U	5.85 UJ	28.3	NR
48-001-WR-2	4.85 U	12.4 J	1.2	66.3	66	23.4	38100	0.146 J	569	770 J	6.64 U	6.41 UJ	22.3	NR
48-001-WR-3	4.7 U	3.8 J	0.9 U	39.5	103	22.1	23500	0.185 J	384	489 J	6.44 U	6.22 UJ	14.4	NR
BACKGROUND	4.27 U	30.7 J	0.8 U	54	147	18.5	33400	0.028 U	668	551 J	5.85 U	5.65 UJ	25.8	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
48-001-WR-1	<0.01	0	37.5	37.5	<0.01	<0.01	<0.01	0	37.5
48-001-WR-2	<0.01	0	37.8	37.8	<0.01	0.01	<0.01	0.31	37.5
48-001-WR-3	<0.01	0	11.3	<0 11.3	<0.01	<0.01	0.01	0	11.3

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
48-001-SW-1	0.96 U	2.01 U	2.57 U	9.7 U	18.1 J	1.57	21.6	0.14 JX	4.08 U	12.7 U	3.62 J	30.7 U	7.57 U	121
48-001-SW-2	0.96 U	2.01 U	2.57 U	9.7 U	12.3 J	1.55 U	135	0.19 JX	14.6	12.7 U	3.14 J	30.7 U	8.37 J	70.6

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
48-001-SW-1	149	< 5.0	14	0.24	NR
48-001-SW-2	97	< 5.0	5	NR	NR

LEGEND

SE2 – Mountain View Lake just prior to discharge.
WR1 – Composite of subsamples WR1A and 1C.
WR2 – Composite of subsamples WR1B, 1C, 2A, and 2B.
WR3 – Composite of subsamples WR3A, 3B, 3C, 4, and 5.
BACKGROUND – From the Mouat Mine (48-001-SS-1).
SW1 – Adit discharge.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

MOUAT MINE
PA NO. 48-001

Mine Name: Mouat Mine PA# 48-001
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
48-001-SS-1	7928.35		10044	1173.8	3654.23	1988.42	79632.3			127.725 *	39.0485 *	33.8089
48-001-WR1-A	9381.81		11529.4	126.297 *	4375.43	1557.15 *	83710.4			144.308 *		14.4518 *
48-001-WR1-B	67658.8		9670.28	532.161	26745.8	2122.98 *	100182	860.925 *		163.799 *		
48-001-WR1-C	18716.7		9109.61	191.945 *	8412.97	1831.57 *	83560.4					
48-001-WR2-A	31015.2	457.903 *	11159.1	90.4239 *	9323.86	2464.79 *	80919.5			142.134 *		11.0061 *
48-001-WR2-B	29164.9		12645.4		12965.6	1478.7 *	83348			147.663 *		9.83818 *
48-001-WR2-C	4921.93		10743.5	157.785 *	2318.08	1289.85 *	85702.1			111.77 *		13.2156 *
48-001-WR3-A	4735.15		22864.8	213.639 *	1998.23	1293.26 *	51884.4			99.4765 *		21.5015 *
48-001-WR3-B	36879.4		10643.9	242.669 *	15032.4	2117.25 *	79941.6			162.249 *		15.8724 *
48-001-WR3-C	29100.9		13515.6	131.259 *	12284.7	1882.8 *	79146.9			107.967 *		21.3385 *
48-001-WR-1-COMP	7932.16		9344.48	162.221 *	3683.41	1596.7	79157.6			134.591 *		9.74813 *
48-001-WR-2-COMP	26944.9		9332.45		9776.71	1429.68 *	78402.7			118.048 *		12.4396 *
48-001-WR-3-COMP	29005.4		12110		10604.7	1499.61 *	68438.3	477.354 *		120.137 *	31.2347 *	11.5581 *
48-001-WR-4	91401.2		5901.07	232.815 *	37407.4	2391.52 *	85233.2	620.643 *		181.454 *		
48-001-WR-5	4169.19		16665.6	384.573 *	2392.8	1430.91	72766.9			92.0656 *		12.4254 *

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
48-001-SS-1	41.0835				21.6119 *			57.886	85.7455 *		
48-001-WR1-A									114.983 *		
48-001-WR1-B						241.834 *			132.868 *		
48-001-WR1-C											
48-001-WR2-A						199.772 *			104.169 *		
48-001-WR2-B									111.962 *		
48-001-WR2-C						258.049 *			151.079 *		
48-001-WR3-A	4.66133 *								107.691 *		
48-001-WR3-B	5.92505 *					180.247 *			154.856 *		
48-001-WR3-C	10.4114 *								156.917 *		
48-001-WR-1-COMP									103.916 *		
48-001-WR-2-COMP											
48-001-WR-3-COMP	5.34557 *										
48-001-WR-4	9.02667 *					310.683 *			197.807 *		
48-001-WR-5	9.91332 *								119.061 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

MOUAT TAILINGS
PA NO. 48-004

AIMSS SCORESHEET

SITE NAME: MOUAT MINE
PA NUMBER: 48-001

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	12.734
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	13.037
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	11994
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.270
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	911
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	75
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.263
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	39
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.13**

SITE NAME: MOUAT MINE
PA NUMBER: 48-001

LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	480
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	605
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**6.05**

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

TABLE 3

STATION CCMV1 - SUMMARY OF WATER QUALITY ANALYSES

LAB NO.:	88-18269	88-19047	89-1651	89-2362
SAMPLE IDENTIFICATION	CCMV1	CCMV1	CCMV1	CCMV1
SAMPLE DATE:	11/30/88	12/22/88	01/26/89	02/26/89
SAMPLE TIME:	1030	1235	07:40	0840
CONSTITUENT (mg/L)				
pH	8.0	7.9	7.8	7.1
Sp. Conductance @ 25`C, umhos/cm	133	131	130	135
Total Suspended Solids	<1	1	2	<1
Total Dissolved Solids @ 180`C	88	62	47	85
Turbidity, N.T.U.	0.23	0.21	0.24	0.21
Total Alkalinity as CaCO3	74	64	66	64
Total Acidity	0	0	0	0
Total Hardness as CaCO3	64	65	66	65
Aluminum, Total	<0.1	<0.1	<0.1	<0.1
Aluminum, Dissolved	<0.1	<0.1	<0.1	<0.1
Ammonia	<0.1	<0.1	<0.1	<0.1
Arsenic, Total	<0.005	<0.005	<0.005	<0.005
Arsenic, Dissolved	<0.005	<0.005	<0.005	<0.005
Barium, Total	<0.1	<0.1	<0.1	<0.1
Barium, Dissolved	<0.1	<0.1	<0.1	<0.1
Bicarbonate	90	78	81	79
Boron, Total	<0.1	<0.1	0.1	<0.1
Boron, Dissolved	<0.1	<0.1	0.1	<0.1
Cadmium, Total	0.002	0.001	<0.001	0.001
Cadmium, Dissolved	0.002	<0.001	<0.001	0.001
Calcium	13	13	13	13
Carbonate	0	0	0	0
Chloride	2	<1	<1	2
Chromium, Total	0.03	0.04	0.04	0.04
Chromium, Dissolved	0.03	0.04	0.04	0.04
Copper, Total	<0.01	<0.01	<0.01	<0.01
Copper, Dissolved	<0.01	<0.01	<0.01	<0.01
Fluoride	<0.10	<0.10	<0.10	<0.10
Iron, Total	<0.03	<0.03	<0.03	<0.03
Iron, Dissolved	<0.03	<0.03	<0.03	<0.03
Lead, Total	<0.01	<0.01	<0.01	<0.01
Lead, Dissolved	<0.01	<0.01	<0.01	<0.01
Magnesium	8	8	8	8
Manganese, Total	<0.02	<0.02	<0.02	<0.02
Manganese, Dissolved	<0.02	<0.02	<0.02	<0.02
Mercury, Total	<0.001	<0.001	<0.001	<0.001
Mercury, Dissolved	<0.001	<0.001	<0.001	<0.001
Molybdenum, Total	<0.005	<0.005	<0.005	<0.005
Molybdenum, Dissolved	<0.005	<0.005	<0.005	<0.005
Nickel, Total	<0.03	<0.03	<0.03	<0.03
Nickel, Dissolved	<0.03	<0.03	<0.03	<0.03
Nitrate plus Nitrite as N	<0.05	<0.05	<0.05	<0.05
Ortho-Phosphate as P	<0.01	<0.01	<0.01	<0.01
Total Phosphorus as P	0.03	<0.01	0.02	0.01
Potassium	<1	<1	<1	<1
Selenium, Total	<0.005	<0.005	<0.005	<0.005
Selenium, Dissolved	<0.005	<0.005	<0.005	<0.005
Silver, Total	<0.005	<0.005	<0.005	<0.005
Silver, Dissolved	<0.005	<0.005	<0.005	<0.005
Sodium	4	4	4	3
Sulfate	4	4	5	5
Zinc, Total	0.01	0.02	0.02	<0.01
Zinc, Dissolved	0.01	0.02	0.01	<0.01

TABLE 4

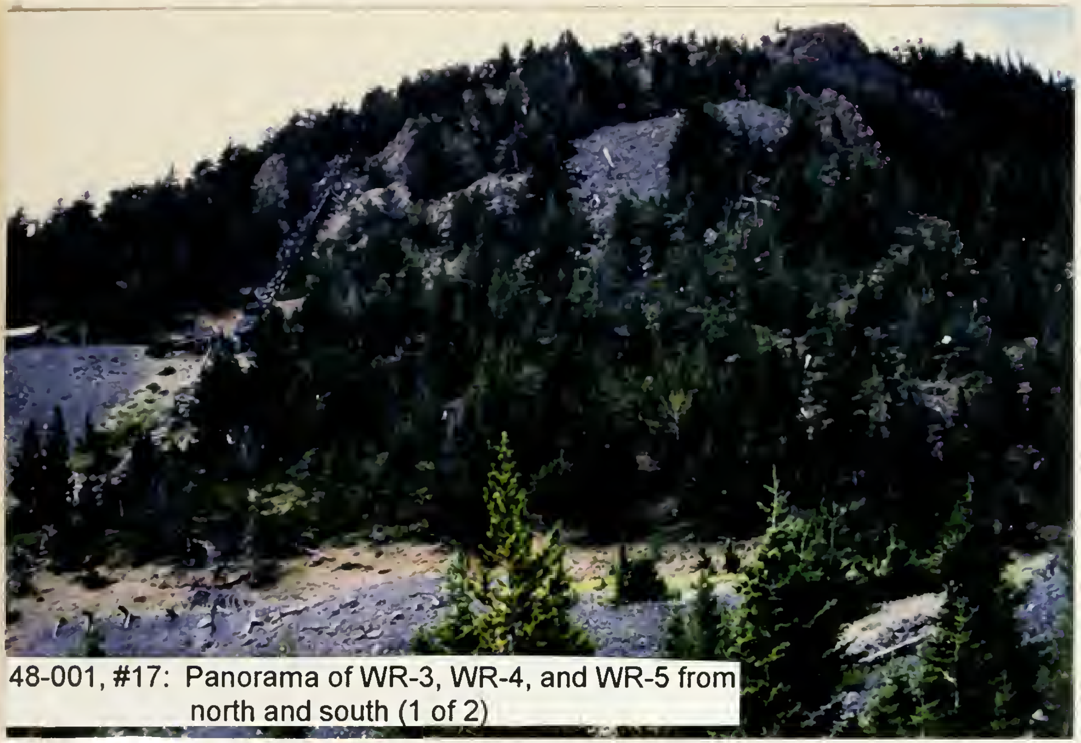
STATION CCMVL - SUMMARY OF WATER QUALITY ANALYSES

LAB NO.:	88-18274	88-19050	89-1650	89-2365
SAMPLE IDENTIFICATION	CCMVL	CCMVL	CCMVL	CCMVL
SAMPLE DATE:	11/30/88	12/22/88	01/26/89	02/26/89
SAMPLE TIME:	1320	1155	09:45	1030
CONSTITUENT (mg/L)				
pH	8.0	7.7	7.7	7.3
Sp. Conductance @ 25`C, umhos/cm	179	190	193	222
Total Suspended Solids	10	<1	<1	<1
Total Dissolved Solids @ 180`C	108	99	97	138
Turbidity, N.T.U.	3.3	1.3	0.81	5.1
Total Alkalinity as CaCO3	91	93	98	110
Total Acidity	0	0	0	0
Total Hardness as CaCO3	97	96	99	111
Aluminum, Total	0.2	<0.1	<0.1	0.1
Aluminum, Dissolved	<0.1	<0.1	<0.1	<0.1
Ammonia	<0.1	<0.1	<0.1	<0.1
Arsenic, Total	<0.005	<0.005	<0.005	<0.005
Arsenic, Dissolved	<0.005	<0.005	<0.005	<0.005
Barium, Total	<0.1	<0.1	<0.1	<0.1
Barium, Dissolved	<0.1	<0.1	<0.1	<0.1
Bicarbonate	111	113	120	134
Boron, Total	<0.1	<0.1	<0.1	<0.1
Boron, Dissolved	<0.1	<0.1	<0.1	<0.1
Cadmium, Total	0.001	<0.001	0.003	<0.001
Cadmium, Dissolved	0.001	<0.001	0.001	0.001
Calcium	22	22	22	25
Carbonate	0	0	0	0
Chloride	2	<1	<1	1
Chromium, Total	<0.02	<0.02	<0.02	<0.02
Chromium, Dissolved	<0.02	<0.02	<0.02	<0.02
Copper, Total	<0.01	<0.01	<0.01	<0.01
Copper, Dissolved	<0.01	<0.01	<0.01	<0.01
Fluoride	<0.10	<0.10	<0.10	<0.10
Iron, Total	0.25	0.08	0.05	0.22
Iron, Dissolved	<0.03	<0.03	<0.03	<0.03
Lead, Total	<0.01	<0.01	<0.01	0.01
Lead, Dissolved	<0.01	<0.01	<0.01	<0.01
Magnesium	10	10	11	12
Manganese, Total	<0.02	<0.02	<0.02	<0.02
Manganese, Dissolved	<0.02	<0.02	<0.02	<0.02
Mercury, Total	<0.001	<0.001	<0.001	<0.001
Mercury, Dissolved	<0.001	<0.001	<0.001	<0.001
Molybdenum, Total	<0.005	<0.005	<0.005	<0.005
Molybdenum, Dissolved	<0.005	<0.005	<0.005	<0.005
Nickel, Total	<0.03	<0.03	<0.03	<0.03
Nickel, Dissolved	<0.03	<0.03	<0.03	<0.03
Nitrate plus Nitrite as N	<0.05	<0.05	<0.05	<0.05
Ortho-Phosphate as P	<0.01	<0.01	<0.01	<0.01
Total Phosphorus as P	0.05	0.03	0.02	0.04
Potassium	<1	<1	1	1
Selenium, Total	<0.005	<0.005	<0.005	<0.005
Selenium, Dissolved	<0.005	<0.005	<0.005	<0.005
Silver, Total	<0.005	<0.005	<0.005	<0.005
Silver, Dissolved	<0.005	<0.005	<0.005	<0.005
Sodium	5	5	5	5
Sulfate	6	6	8	8
Zinc, Total	0.03	0.03	<0.01	0.01
Zinc, Dissolved	0.02	0.02	<0.01	<0.01

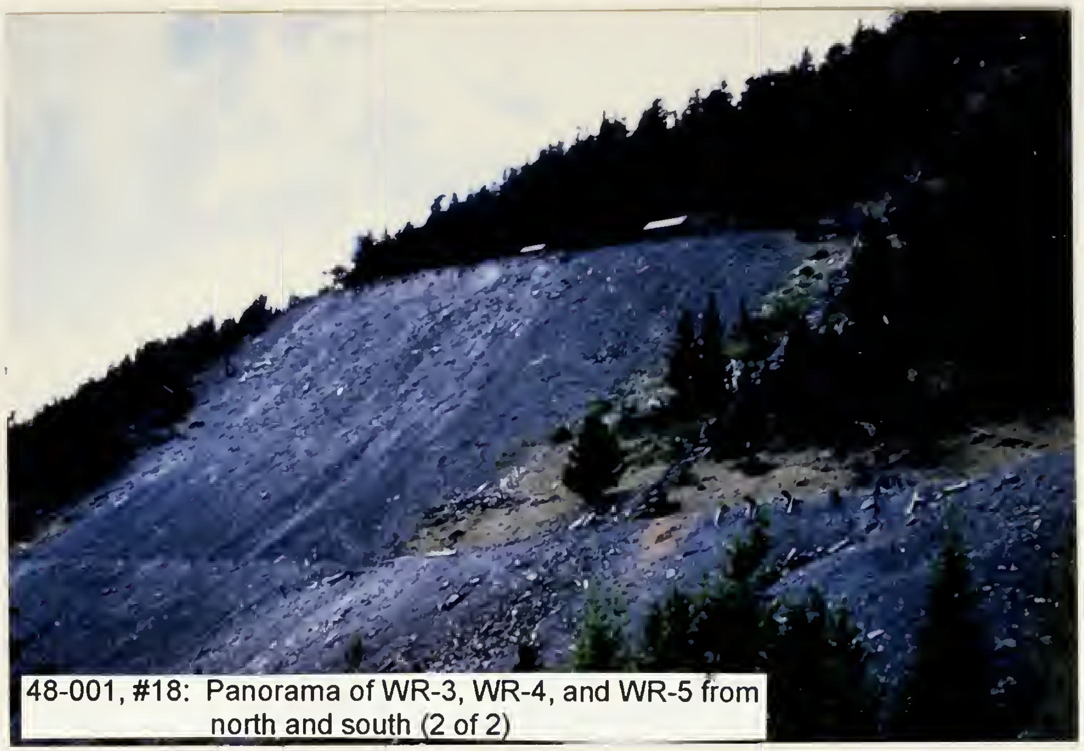
TABLE 5

STATION CCMV2 - SUMMARY OF WATER QUALITY ANALYSES

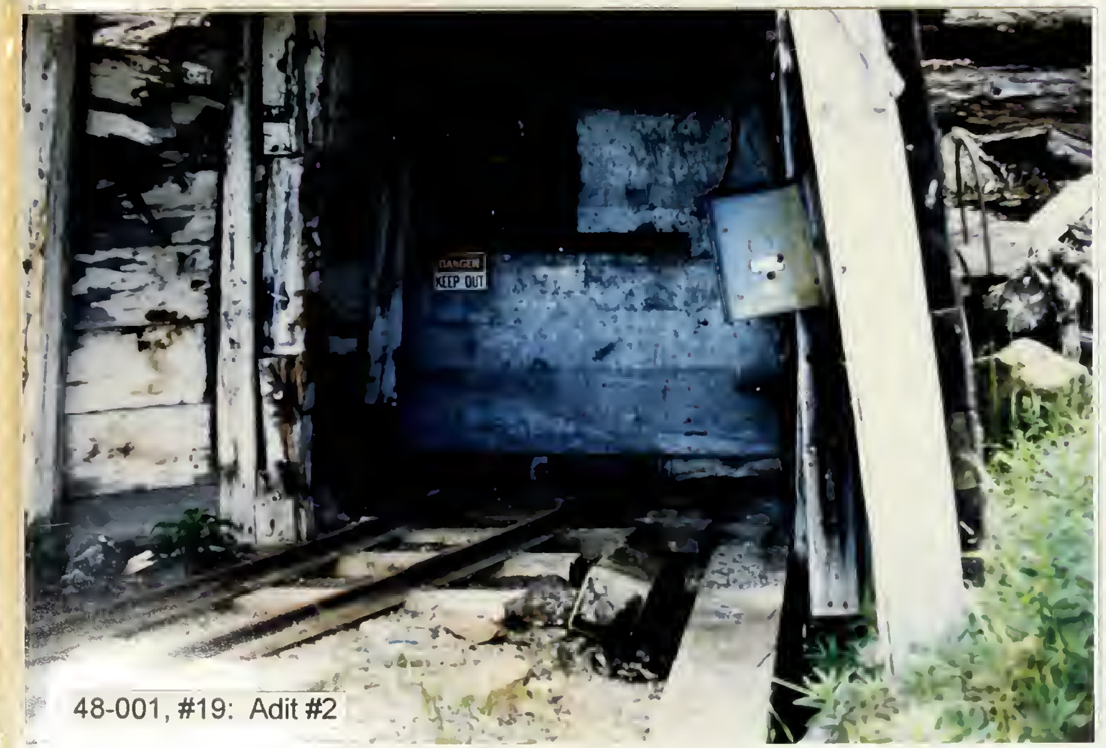
LAB NO.:	88-18270	88-19048	89-1652	89-2363
SAMPLE IDENTIFICATION	CCMV2	CCMV2	CCMV2	CCMV2
SAMPLE DATE:	11/30/88	12/22/88	01/26/89	02/26/89
SAMPLE TIME:	1400	1130	08:15	0940
CONSTITUENT (mg/L)				
pH	8.2	8.1	8.0	7.8
Sp. Conductance @ 25`C, umhos/cm	179	178	180	178
Total Suspended Solids	6	<1	10	<1
Total Dissolved Solids @ 180`C	109	97	75	102
Turbidity, N.T.U.	1.7	1.4	1.1	1.9
Total Alkalinity as CaCO3	85	86	94	88
Total Acidity	0	0	0	0
Total Hardness as CaCO3	92	94	97	93
Aluminum, Total	<0.1	<0.1	<0.1	<0.1
Aluminum, Dissolved	<0.1	<0.1	<0.1	<0.1
Ammonia	<0.1	<0.1	<0.1	<0.1
Arsenic, Total	<0.005	<0.005	<0.005	<0.005
Arsenic, Dissolved	<0.005	<0.005	<0.005	<0.005
Barium, Total	<0.1	<0.1	<0.1	<0.1
Barium, Dissolved	<0.1	<0.1	<0.1	<0.1
Bicarbonate	103	105	114	107
Boron, Total	<0.1	<0.1	<0.1	<0.1
Boron, Dissolved	<0.1	<0.1	<0.1	<0.1
Cadmium, Total	<0.001	0.001	0.001	0.001
Cadmium, Dissolved	<0.001	0.001	0.001	0.001
Calcium	19	18	20	18
Carbonate	0	0	0	0
Chloride	<1	<1	<1	2
Chromium, Total	<0.02	<0.02	<0.02	<0.02
Chromium, Dissolved	<0.02	<0.02	<0.02	<0.02
Copper, Total	<0.01	<0.01	<0.01	<0.01
Copper, Dissolved	<0.01	<0.01	<0.01	<0.01
Fluoride	<0.10	<0.10	<0.10	<0.10
Iron, Total	0.36	0.31	0.17	0.28
Iron, Dissolved	0.08	0.08	0.04	0.06
Lead, Total	<0.01	<0.01	<0.01	<0.01
Lead, Dissolved	<0.01	<0.01	<0.01	<0.01
Magnesium	11	12	11	12
Manganese, Total	0.13	0.09	0.06	0.11
Manganese, Dissolved	0.02	<0.02	<0.02	<0.02
Mercury, Total	<0.001	<0.001	<0.001	<0.001
Mercury, Dissolved	<0.001	<0.001	<0.001	<0.001
Molybdenum, Total	<0.005	<0.005	<0.005	<0.005
Molybdenum, Dissolved	<0.005	<0.005	<0.005	<0.005
Nickel, Total	<0.03	<0.03	<0.03	<0.03
Nickel, Dissolved	<0.03	<0.03	<0.03	<0.03
Nitrate plus Nitrite as N	0.1	0.09	0.08	0.15
Ortho-Phosphate as P	<0.01	<0.01	<0.01	<0.01
Total Phosphorus as P	0.03	0.02	0.02	0.01
Potassium	1	<1	<1	<1
Selenium, Total	<0.005	<0.005	<0.005	<0.005
Selenium, Dissolved	<0.005	<0.005	<0.005	<0.005
Silver, Total	<0.005	<0.005	<0.005	<0.005
Silver, Dissolved	<0.005	<0.005	<0.005	<0.005
Sodium	4	4	5	3
Sulfate	6	5	6	6
Zinc, Total	0.01	0.02	0.03	0.01
Zinc, Dissolved	0.01	0.01	0.02	<0.01



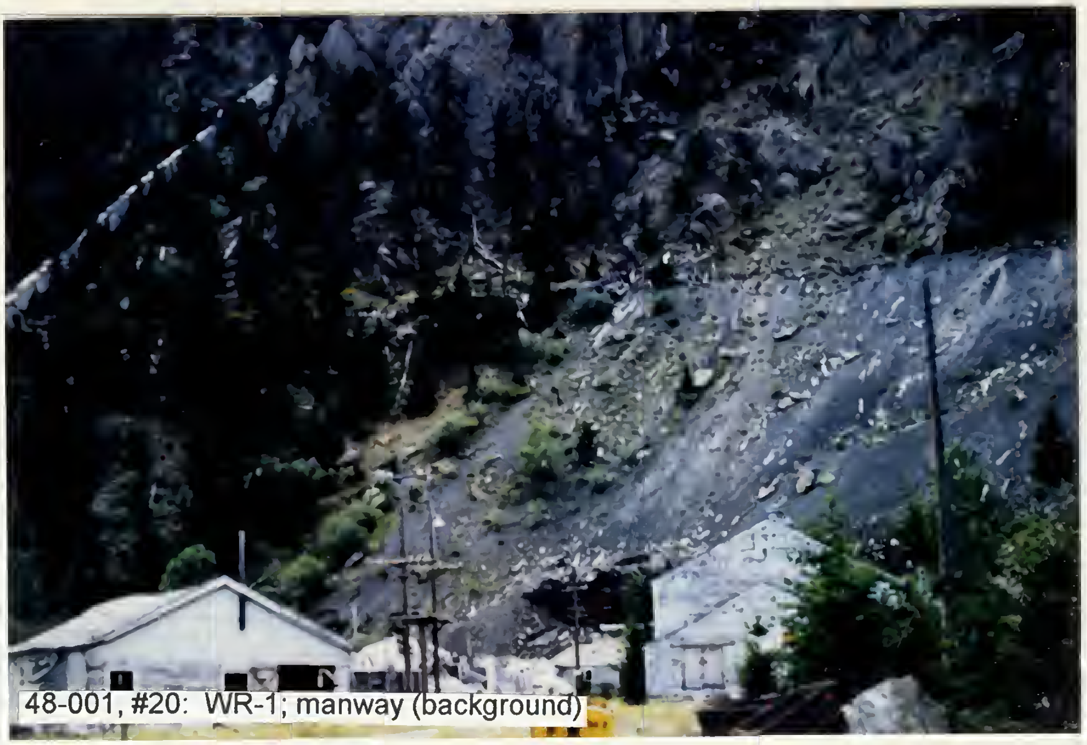
48-001, #17: Panorama of WR-3, WR-4, and WR-5 from north and south (1 of 2)



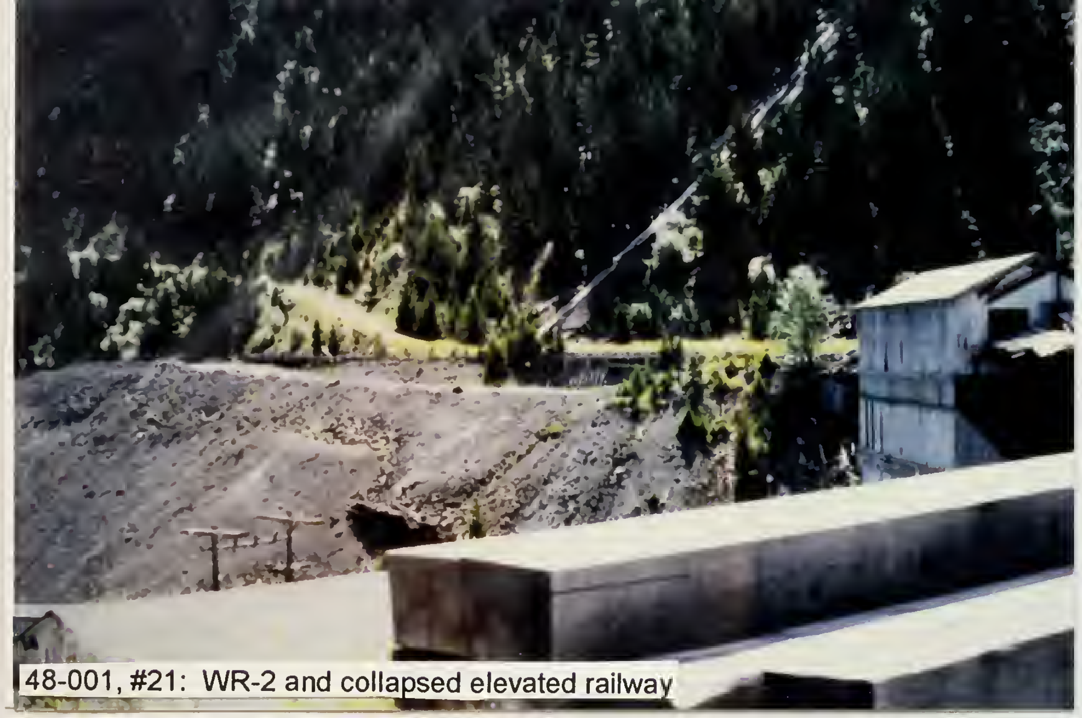
48-001, #18: Panorama of WR-3, WR-4, and WR-5 from north and south (2 of 2)

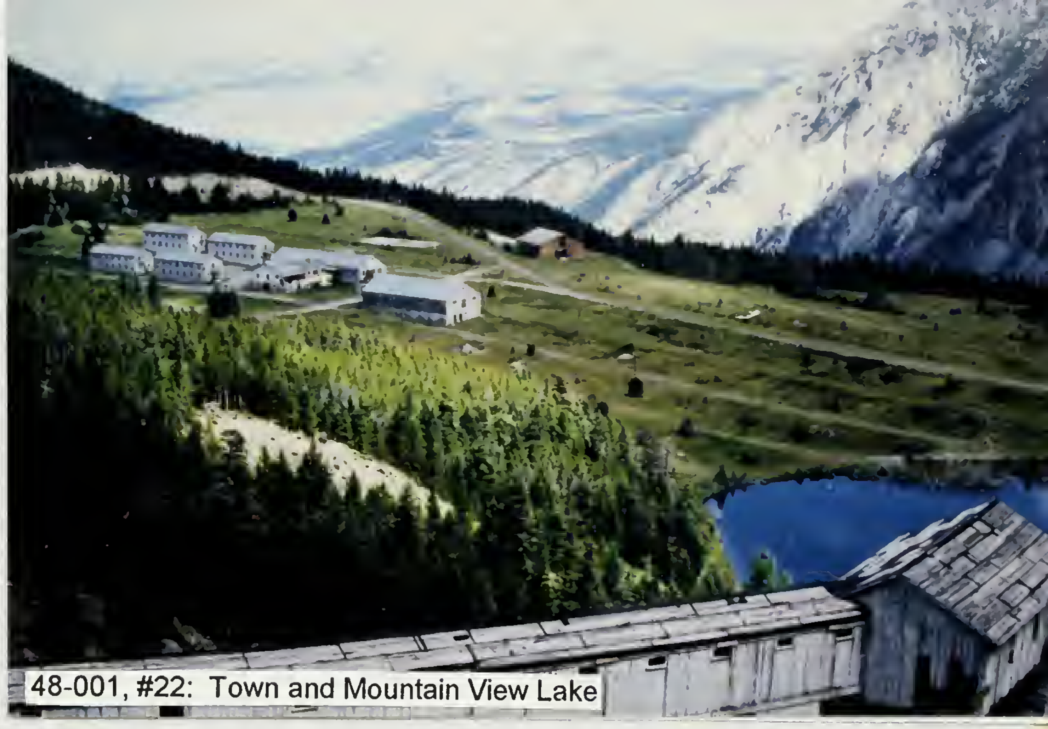


48-001, #19: Adit #2



48-001, #20: WR-1; manway (background)


48-001, #21: WR-2 and collapsed elevated railway


48-001, #22: Town and Mountain View Lake

STILLWATER

SWEET GRASS

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BENBOW MILLSITE PA#: 48-005

Date: August 11, 1993 Time: 1000

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (65°F-70°F); partly cloudy to raining; slight breeze (5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #24: Lower mill foundation; #25: Upper mill foundation; #26: Tailings area overview; #27: TP-1; #28: TP-2. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Most of the tailings have revegetated; remaining barren areas need coversoiling and reseeding.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BENBOW MILLSITE PA#: 48-005

Legal Description: T 5S ;R 16E ;Sec. 21 , NW1/4 ___1/4 ___1/4

County: STILLWATER Mining District: STILLWATER

Latitude: N 45° 23' 20" Longitude: W 109° 45' 55"

Primary Drainage Basin and Code: Stillwater River/10070005
Secondary Drainage Basin: Little Rocky Creek

USGS Quadrangle map name(s): Nye

Mine Type/Commodities: Hardrock/Chromium, Iron, Nickel

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Custer National Forest, P.O. Box 2556, Billings, MT 59103.

Relationship to other mines/sites in the area/district: Ore came from the Benbow Mine located two miles to the southeast. Similar deposits are present at the Mouat Mine and at the active Stillwater mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Site was treated for safety concerns by Spectrum Engineering for MDSL/AMRB in 1990.

General site features: Elevation 6000', Slope 20%,
Aspect Northeast

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? 0.25 acres.
Dimensions: Site is 580 feet x 400 feet and mostly vegetated.

Predominant vegetation types: Grasses, aspen, roses, wildflowers, lupines, ragweed, thistles

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). At beginning of the road leading to Benbow Mine

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Mill is located to the northwest of perennial unnamed tributary to the perennial Little Rocky Creek. Sec. 21 contains the Torchlight Sandstone, and the Peay Sandstone (member of the Frontier Formation). Little Rocky Creek contains till from piedmont glaciers. A thrust fault may be present in the very northwest northeast corner of Sec. 21.

Mining/milling history, ore type/tenor, host rock, gangue: One 500-ton unit was completed at Benbow during the site's short lifetime; 186,369 dry tons of ore containing 18.34% chromic oxide was treated. Concentrates produced 72,566 dry tons containing 41.46% chromic oxide. Mill recovery during the first three months was 82.17%, but reached an average of 90.82%. Benbow and Mouat mines have produced more than 900,000 tons of chromite concentrate averaging 38.0% chromic oxide. Chromium/iron ratios range from 1.61:1 and 1.91:1. All production has come from the Stillwater Complex, a belt of ultra-mafic rocks and anorthosite. Metals of economic interest are chromium, nickel, copper, and platinum group metals. Copper and nickel are present as lenses and pods of pentlandite, pyrrhotite and chalcopyrite in hornfels.

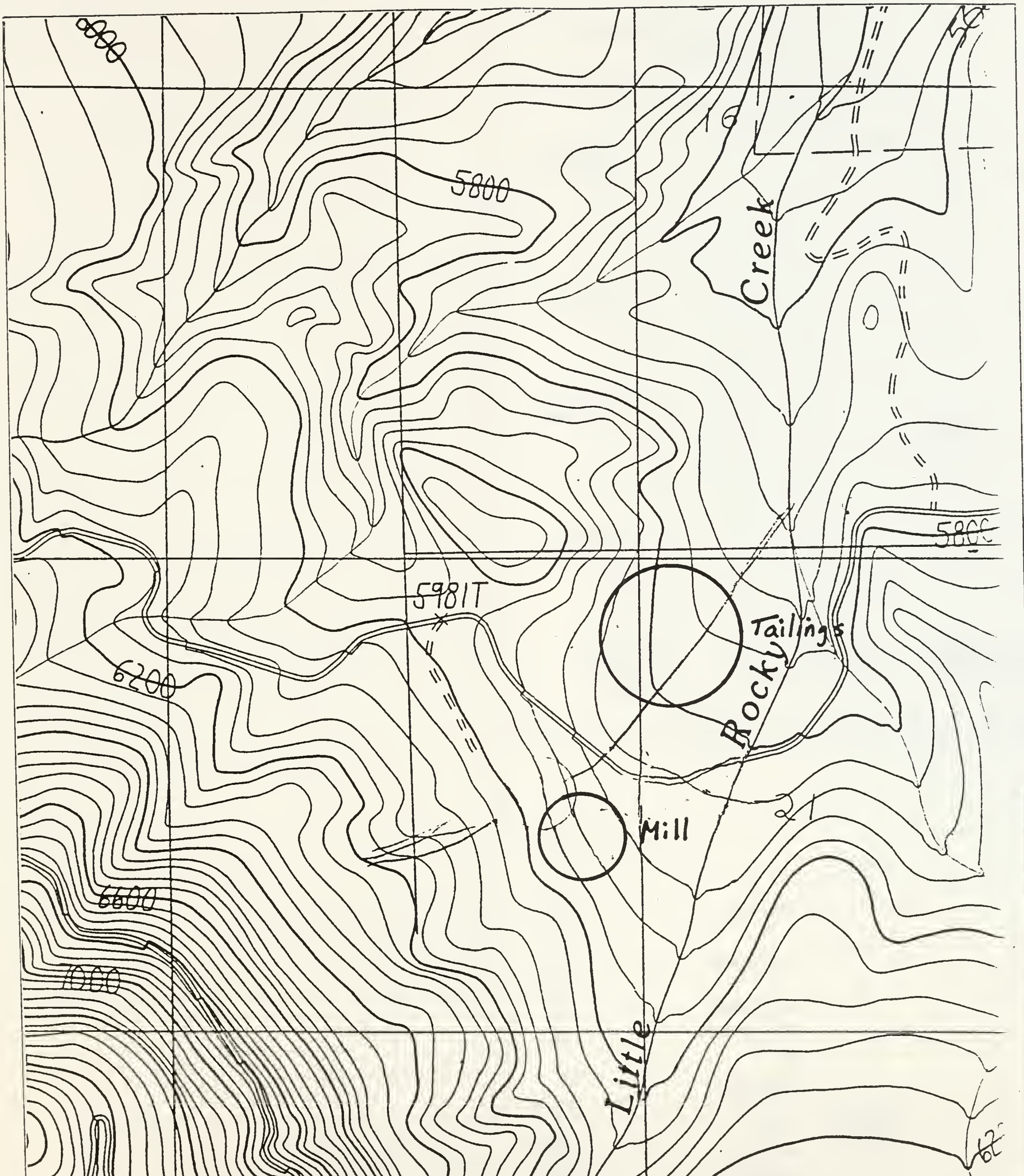
Mine Operation?
Shafts - Yes___, No X, # ____, Comment
Adits - Yes X, No___, # 3, Comment All backfilled
Pits - Yes___, No X, # ____, Comment
Placers - Yes___, No X, # ____, Comment
Other - Yes___, No X, # ____, Comment

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: March 1, 1942 to June 21, 1943

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Benbow Mine

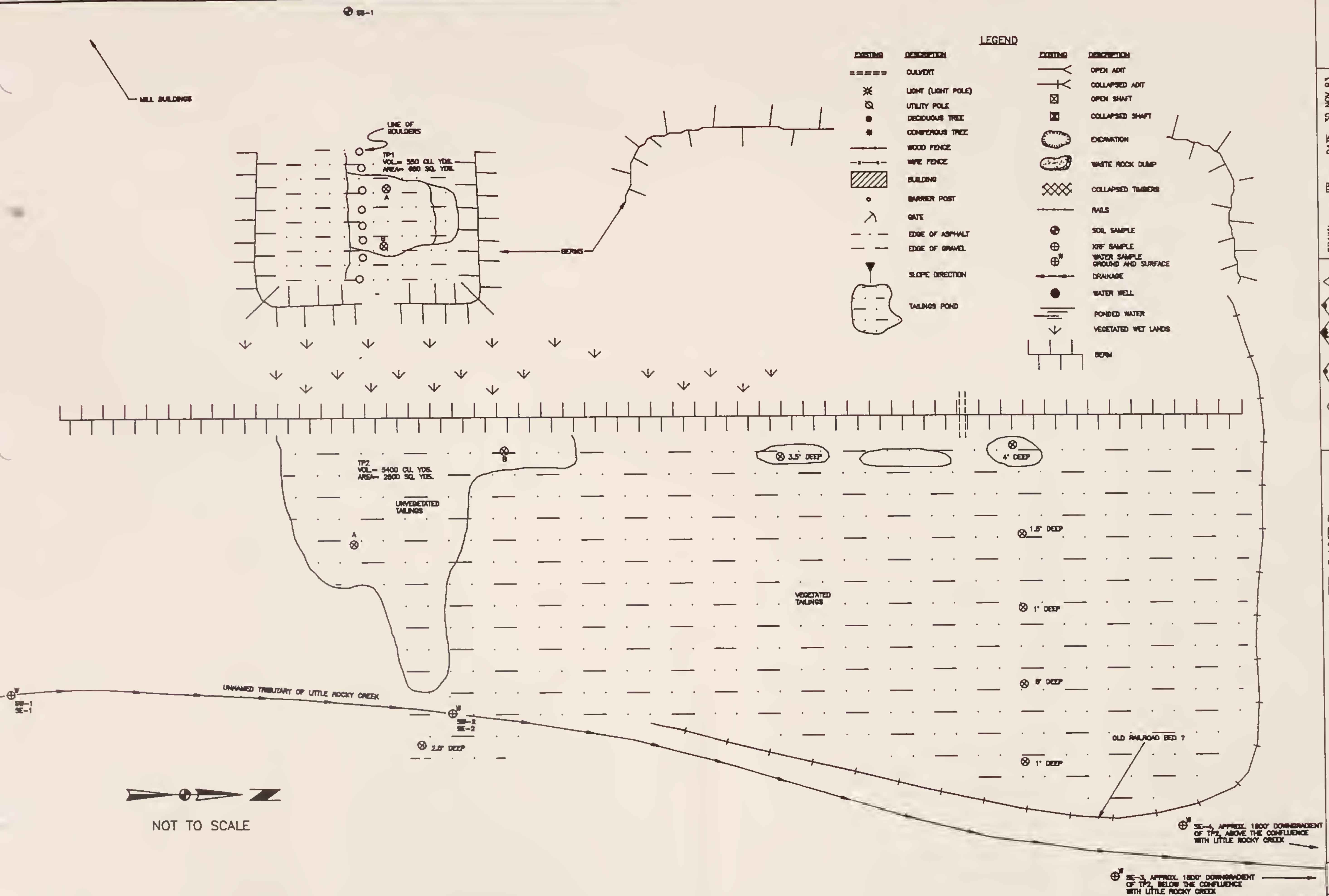
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
Gravity concentration



PIONEER
TECHNICAL SERVICES, INC.

BENBOW MILL, P.A. NO. 48-005

T05S, R16E, SECTION 21
SCALE: 1" = 1000'



DRAWN JTP DATE 30 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

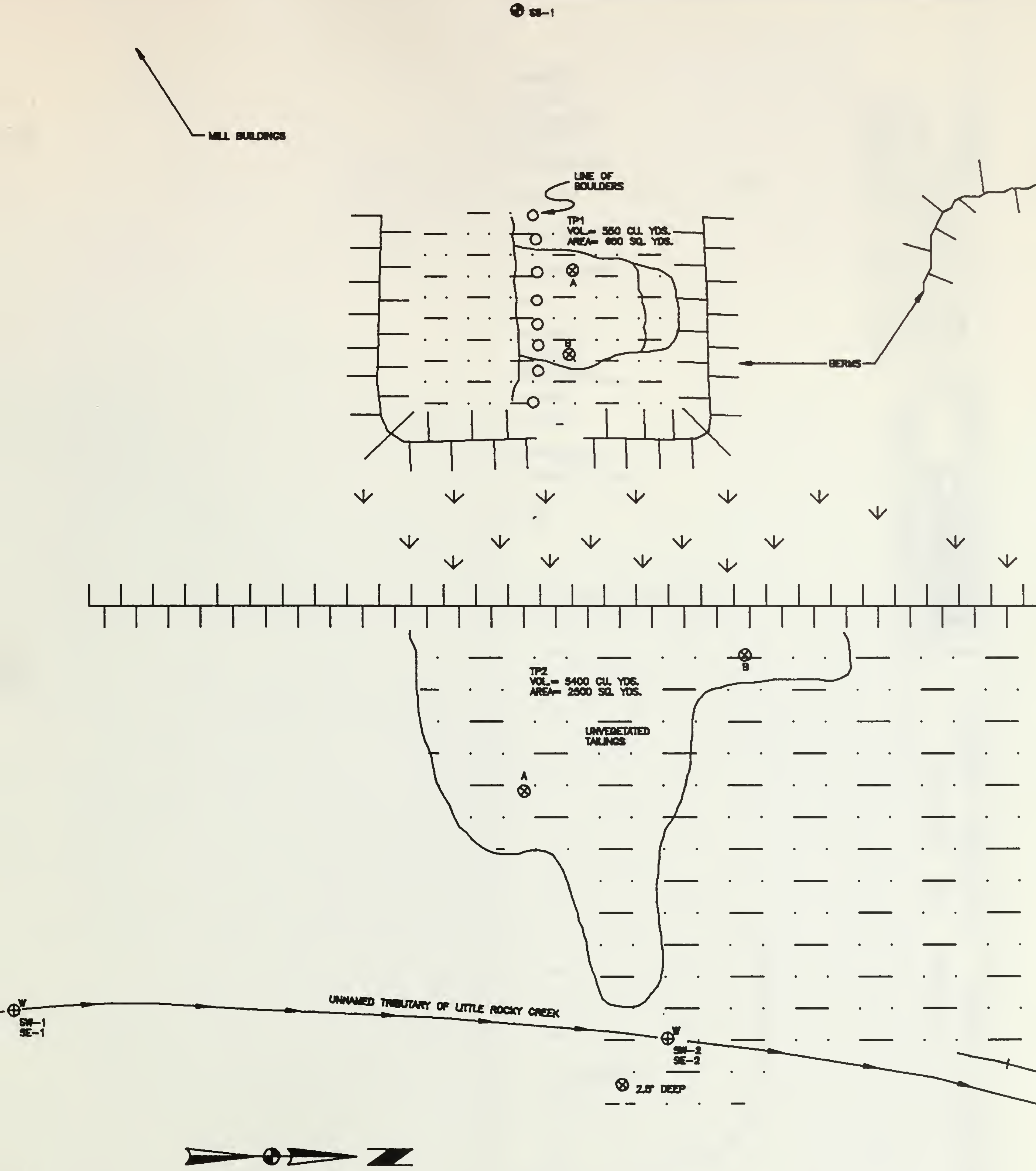
TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BENBOW MILLSITE PA# 48-005
STILLWATER DISTRICT STILLWATER COUNTY

SHEET NO.

SHEETS

SS-1
MILL BUILDINGS
LINE OF BOULDERS
TP1
VOL.= 550 CU. YDS.
AREA= 660 SQ. YDS.
A
B
BERMS
TP2
VOL.= 5400 CU. YDS.
AREA= 2500 SQ. YDS.
UNVEGETATED TAILINGS
A
B
UNNAMED TRIBUTARY OF LITTLE ROCKY CREEK
W
SW-1
SE-1
W
SW-2
SE-2
2.5' DEEP
N
NOT TO SCALE

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 100% black sand

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): No stratification; tailings were 8+ feet deep at southeast end. Saturated sands were intersected and collapsing hole kept from augering deeper. Near berm, tailings were between 4 and 6 feet deep.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Tailings near creek are saturated at approx. 8 feet.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundment on creek side. Berm present may be the result of tailings being pushed away from the creek.

Comments on potential for mitigation: Tailings are present on both sides of the creek and are self-revegetating. The unvegetated area may just need seeding and organic matter mixed in.

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	550	Northeast corner of unvegetated part; 0-1′	Small impoundment with drainage into wetlands	6.2 (D)	0.03	48-005-TP-1	08/11/93 1625	T-Metals, ABA
TP-1B-A	TAIL		Northwest corner of unvegetated part; 0-1′	Small impoundment with drainage into wetlands	6.4 (D)	0.03			
TP-1B-B	TAIL		Northwest corner of unvegetated part; 1-1.5′	Small impoundment with drainage into wetlands	6.8 (D)	0.04			
TP-2A-A	TAIL	5,400	Southeast end of large unvegetated part, approx. 80 feet up from stream; 0-6.5′	None	6.8 (D)	0.03	48-005-TP-2	08/11/93 1630	T-Metals, ABA
TP-2A-B	TAIL		Southeast end of large unvegetated part, approx. 80 feet up from stream; 6.5-8′	None	6.7 (D)	0.03			
TP-2B-A	TAIL		North end of large unvegetated part, by berm; 0-4.5′	None	6.7 (D)	0.04			
TP-2B-B	TAIL		North end of large unvegetated part, by berm; underlying soil	None	6.2 (D)	0.03	48-005-TP-3	08/11/93 1635	T-Metals, ABA
SS-1	BKGRND	N/A	Background soil west of tailings	N/A	6.2 (D)	0.03	48-005-SS-1	08/11/93 1330	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 48-005-TP-1 is composite of TP-1A-A, and TP-1B-A and -1B-B. 48-005-TP-2 is composite of TP-2A-A and -2A-B, and TP-2B-A. 48-005-TP-3 is grab of TP-2B-B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes___, No_X_;
Number of well logs: 0

Distance to nearest well used for drinking? 4 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Uncontained source, saturated tailings at 8 feet contain high levels of chromium and nickel; shallow water table.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS:____

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No___, Name(s): Unnamed perennial tributary to Little Rocky Creek; Little Rocky Creek

Dry streambeds: Yes____, No X, Name(s):

Other surface water: Yes____, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No___ Source ID(s): TP-2 is in unnamed tributary of Little Rocky Creek.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? Unnamed tributary, approx. 10 gpm; Little Rocky Creek, 35 gpm

High Flow: 15 gpm; 40 gpm, Average Flow: 8 gpm; 25 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between TP-2 and unnamed tributary of Little Rocky Creek

Surface water draining onto or through waste sources: Yes X, No____, Describe: Unnamed tributary of Little Rocky Creek flows through tailings.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Irrigation, fishery, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes X, No_____, Distance downstream (ft)? 2000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Tailings were observed in unnamed tributary of Little Rocky Creek for approx. 2,000 feet.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	In unnamed tributary north of road crossing	7.55	241	425	NM	91	10 gpm (M)	48-005-SW-1	08/11/93 1445	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	In unnamed tributary north of road crossing	N/A	N/A	N/A	N/A	N/A	N/A	48-005-SE-1	08/11/93 1445	T-Metals
SW-2	SW	In unnamed tributary at base of TP-2	7.38	286	328	NM	147	10 gpm (M)	48-005-SW-2	08/11/93 1340	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	In unnamed tributary at base of TP-2	N/A	N/A	N/A	N/A	N/A	N/A	48-005-SE-2	08/11/93 1340	T-Metals
SE-3	SE	In Little Rocky Creek, 50 feet upstream of confluence with unnamed tributary	8.01	183	254	NM	67	35 cfs (E)	48-005-SE-3	08/11/93 1300	T-Metals
SE-4	SE	In Little Rocky Creek, 50 feet downstream of confluence with unnamed tributary	8.06	196	229	NM	81	35 cfs (E)	48-005-SE-4	08/11/93 1245	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 acres (No AMD)

Wetlands present: Yes_X_, No___, Describe: Streamside

Carbonate rocks/soils: Yes_X_, No___, Describe: Limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 4 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Flammang, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	None	Dry	5,850	2,925	No	Low
TP-2	None	Partial	22,500	5,625	No	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None____

Evidence of recreational use on site: Yes_X_, No___, Describe:_Pop cans, gun shells___________________________________

Accessibility - Fences, warning signs, closed roads?_Unrestricted___

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes_X_, No___, Comment_Bald Eagle_____
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _6_
Sport Fishery Classification - _6_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1__, types and locations:___
One conveyor gallery was not completely backfilled.__________________

Hazardous structures: Yes_X_, No___, Number_1__, types and locations:_
Wall in mill is 20 feet high.________________________________

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:__________________________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1__, types and locations:_Tailings in unnamed tributary___

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

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USGS, Report on Chromite Deposits of the Eastern Part of the Stillwater Complex, Stillwater and Sweetgrass Counties, Montana, General Report No. 133, Written by Peoples, 1949.

USGS, Topographic Map, Nye, Montana, 7 1/2 minute Quadrangle, 1986.

LABORATORY ANALYTICAL DATA

BENBOW MILLSITE
PA NO. 48-005

MDSL AMRB/PIONEER 4/9/93

Benbow Millsite PA# 48-005
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 08/11/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
48-005-SE-1	6.77 U	71	0.74 U	5.62	46 J	13.9	7060	0.051 U	183	23.9	11.6 U	8.82 UJ	39.4	NR
48-005-SE-2	5.38 U	16.1	0.59 U	34.7	497 J	13.3	25200	0.102	625	531	9.22 U	7 UJ	13.9	NR
48-005-SE-3	11.4 U	85.9 J	1.25 UJ	16.5	160	33.9	21600	0.087 U	511	134	38.8	14.9 UJ	68.6	NR
48-005-SE-4	4.76 U	22 J	0.52 UJ	44.7	495	16.1	34800	0.033 U	687	668	8.16 U	6.2 UJ	25.9	NR
48-005-TP-1	5.18 U	9.25 J	1.08 J	68.3	908	26	43700	0.199	1040	953	8.88 U	6.74 UJ	25.6	NR
48-005-TP-2	4.12 U	5.36 J	1.60 J	67.4	715	16.1	44800	0.029 U	754	983	7.06 U	5.36 UJ	24.9	NR
48-005-TP-3	8.66	134 J	0.56 UJ	11.6	66.8	13.5	20700	0.033 U	806	72.3	16.4	6.68 UJ	58.7	NR
BACKGROUND	14.8 J	97.1	0.54 U	6.45	10.8 J	12.9	21100	0.051	381	11.5	11.8	6.41 UJ	58.1	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
48-005-TP-1	0.04	1.25	108	107	<0.01	0.01	0.03	0.31	108
48-005-TP-1DUP	0.04	1.25	109	108	0.01	<0.01	0.04	0.00	109
48-005-TP-2	0.01	0.31	87.3	87.0	<0.01	<0.01	0.01	0.00	87.3
48-005-TP-3	0.03	0.94	10.3	9.35	<0.01	0.01	0.03	0.31	9.97

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
48-005-SW-1	1.18 U	26.3	2.57 U	9.7 U	6.83 U	2.03	112	0.16	4.13	12.7 U	1.09 J	30.7 U	11.7	83
48-005-SW-2	1.19	41.3	2.57 U	9.7 U	8.6	1.7	645	0.12 U	60.4	12.7 U	1.23 J	30.7 U	7.57 U	139

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
48-005-SW-1	123	< 5.0	14	< 0.05	NR
48-005-SW-2	169	< 5.0	7	< 0.05	NR

LEGEND

SE1 - In unnamed trib. N of road crossing.
SE2 - In unnamed trib. at base of tailings pond 2.
SE3 - In Little Rocky Creek, 50' upstream of confluence with unnamed tributary.
SE4 - In Little Rocky Creek, 50' downstream of confluence with unnamed tributary.
TP1 - Composite of subsamples TP1AA, 1BA, and 1BB.
TP2 - Composite of subsamples TP2AA, 2AB, and 2BA.
TP3 - Sample of the TP2BB subsample.

BACKGROUND - From the Benbow Millsite (48-005-SS-1).
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

BENBOW MILLSITE
PA NO. 48-005

Mine Name: Benbow Millsite PA# 48-005
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
48-005-SE-3		4831.84	7703.55	504.889	468.506	540.783 *	10495.2			160.727		56.2172
48-005-SE-4	7219.11	3736.45	6195.62	404.468 *	3912.91	1119.16 *	28356.7	288.17 *		66.5446 *		49.2973
48-005-SS-1		13813.4	5139.36	1361.02	197.548 *	448.646 *	18643.3			115.481 *		89.8
48-005-TP1B-A	29713.1	279.22 *	16123	279.42 *	18946.3	2169.65	62760.4			83.0542 *		14.368 *
48-005-TP1B-B	14218	657.191 *	10629.1	208.692 *	6988.21	1501.97 *	60183.1	406.121 *		87.0381 *		23.5021 *
48-005-TP1-A	36610.7	19834	405.283 *	24435.4		2410.62	65947.5			90.6862 *		15.2879 *
48-005-TP2A-A	10962.5	230.415 *	7670.03	146.404 *	5016.42	1252.5 *	57093.3	452.926 *		97.9823 *		17.6034 *
48-005-TP2A-B	7070.59	408.155 *	7336.79	118.082 *	3044.07	1206.34 *	54316.6	554.826 *		82.0989 *		32.3883
48-005-TP2B-A	12070		11309	182.101 *	5386.81	1574.9 *	60469.9	417.835 *		49.8509 *		11.6662 *
48-005-TP2B-B		20888.6	7128.24	2358.59		790.013 *	25554.7			100.851 *		139.545
48-005-TP-1-COMP	23464.6	1613.05	16359.7	347.642 *	12237.1	1812.26 *	58827.6			91.3031 *		19.2539 *
48-005-TP-2-COMP	10626.3	523.381 *	7098.7		4506.51	921.997 *	56372.1	486.182 *		64.0681 *		14.235 *

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
48-005-SE-3	96.3135				39.6391			84.9809			
48-005-SE-4	41.5584				17.0144 *			105.673			
48-005-SS-1	157.813				83.0555			354.935		16.7735 *	
48-005-TP1B-A											
48-005-TP1B-B	6.95899 *								122.22 *		
48-005-TP1-A	4.28755 *								137.323 *		
48-005-TP2A-A						120.37 *					
48-005-TP2A-B	6.52108 *										
48-005-TP2B-A											
48-005-TP2B-B	235.22				102.702			431.695		18.9904 *	8.14314 *
48-005-TP-1-COMP	15.2707					195.856 *					
48-005-TP-2-COMP									100.911 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BENBOW MILLSITE
PA NO. 48-005

AIMSS SCORESHEET

SITE NAME: BENBOW MILLSITE
PA NUMBER: 48-005

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.582
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.688
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		2
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	24
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	95558
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.036
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	81
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.035
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	5
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	26
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.96**

SITE NAME: BENBOW MILLSITE
PA NUMBER: 48-005

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	125
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**12.50**

SUMMARY OF HISTORICAL ANALYTICAL DATA FROM OTHER SOURCES

TABLE 1
BENBOW MINE & MILL SITE WATER QUALITY SAMPLES
LITTLE ROCKY CREEK

	MINE UPPER	MINE LOWER	MILL ~~UPPER~~ Upgrad	MILL ~~LOWER~~ Downgrad.	MT WQ STD.*
CONSTITUENT: milligrams/liter unless noted					
Potassium	<1	<1	<1	<1	
Sodium	2	2	4	4	
Calcium	5	5	27	27	
Magnesium	2	3	7	7	
Sulfate	2	4	15	14	250
Chloride	1	1	<1	<1	250
Carbonate	0	0	0	0	
Bicarbonate	27	35	106	111	
Total Dissolved Solids @ 180°C	12	4	136	149	
Total Hardness as CaCO3	18	25	99	99	
Total Alkalinity as CaCO3	22	29			
Specific Conductance @ 25°C (μmho/cm)	41	54	196	194	
pH	7	6.8	8.0	7.8	
Fluoride	<0.10	<0.10	<0.10	<0.10	2.4
Nitrate plus Nitrite as N	<0.05	<0.05	<0.05	<0.05	10.
METALS: milligrams/liter					
Arsenic	<.005	<.005	<.005	<.005	0.05
Barium	<0.1	<0.1	<0.1	<0.1	1.00
Cadmium	<.001	<.001	<.001	<.001	0.01
Chromium	<0.02	<0.02	<0.02	<0.02	0.05
Iron	0.09	<0.03	<0.03	<0.03	0.30
Lead	<0.01	<0.01	<0.01	<0.01	0.05
Manganese	<0.02	<0.02	<0.02	<0.02	0.05
Mercury	<.001	<.001	<.001	<.001	0.002
Selenium	<.005	<.005	<.005	<.005	0.01
Silver	.008	<.005	<.005	<.005	0.05

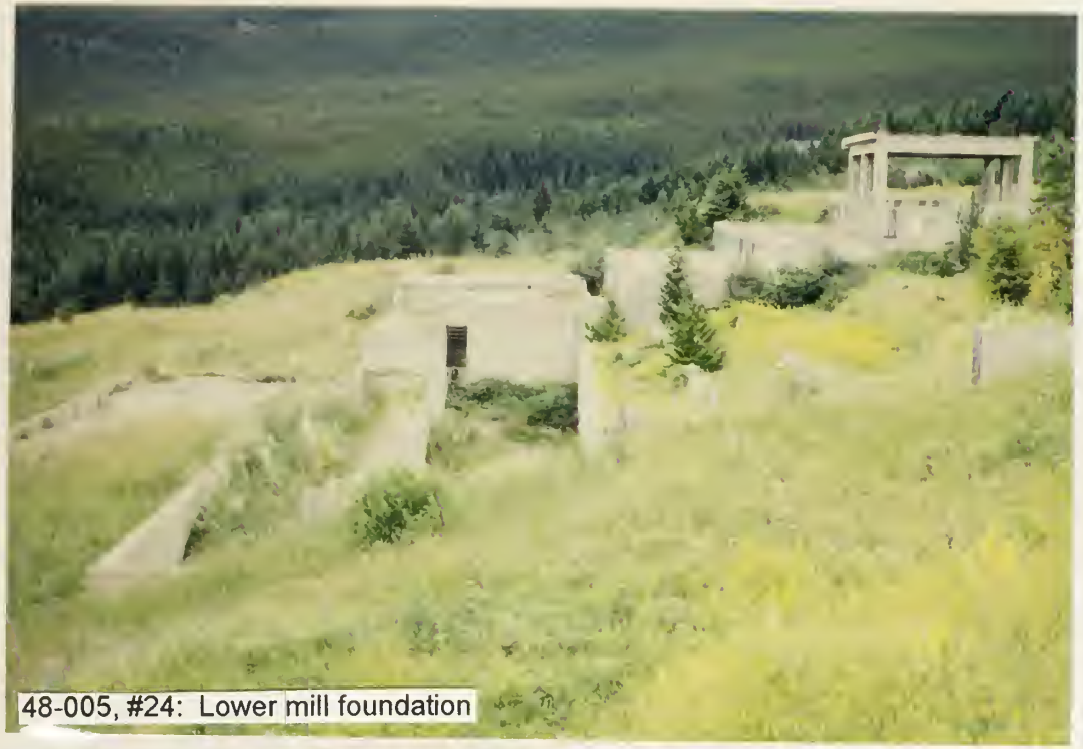
* Montana Department of Health Water Quality Standards.

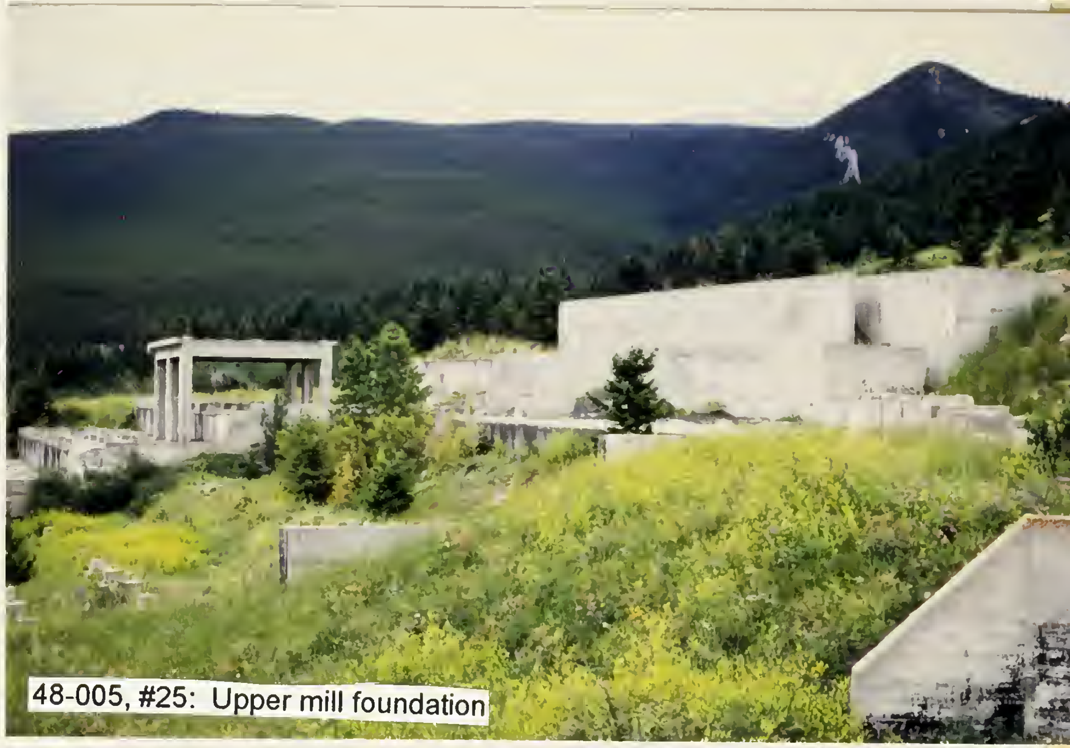
✓Sampled by Spectrum Engineering 10/10/88
✓Analyzed by Energy Laboratories, Billings MT.

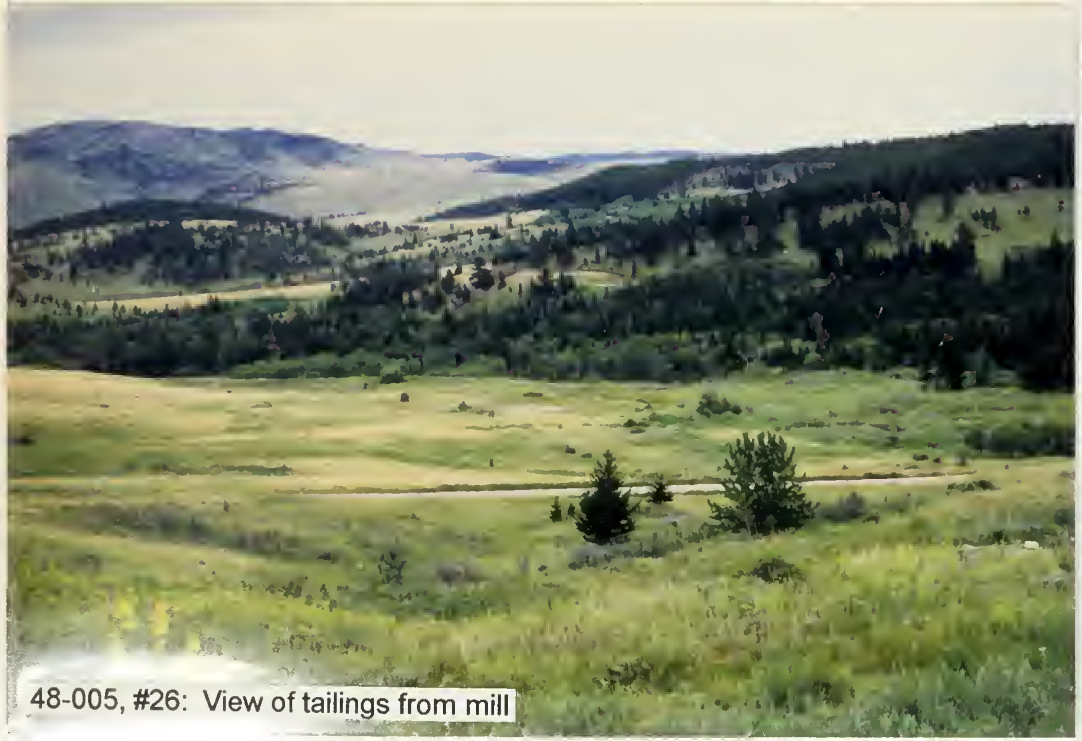
MINE UPPER and MINE LOWER were sampled above and below the Eclipse Adit waste dump.

MILL UPPER and MILL LOWER were sampled above and below the mill tailings.

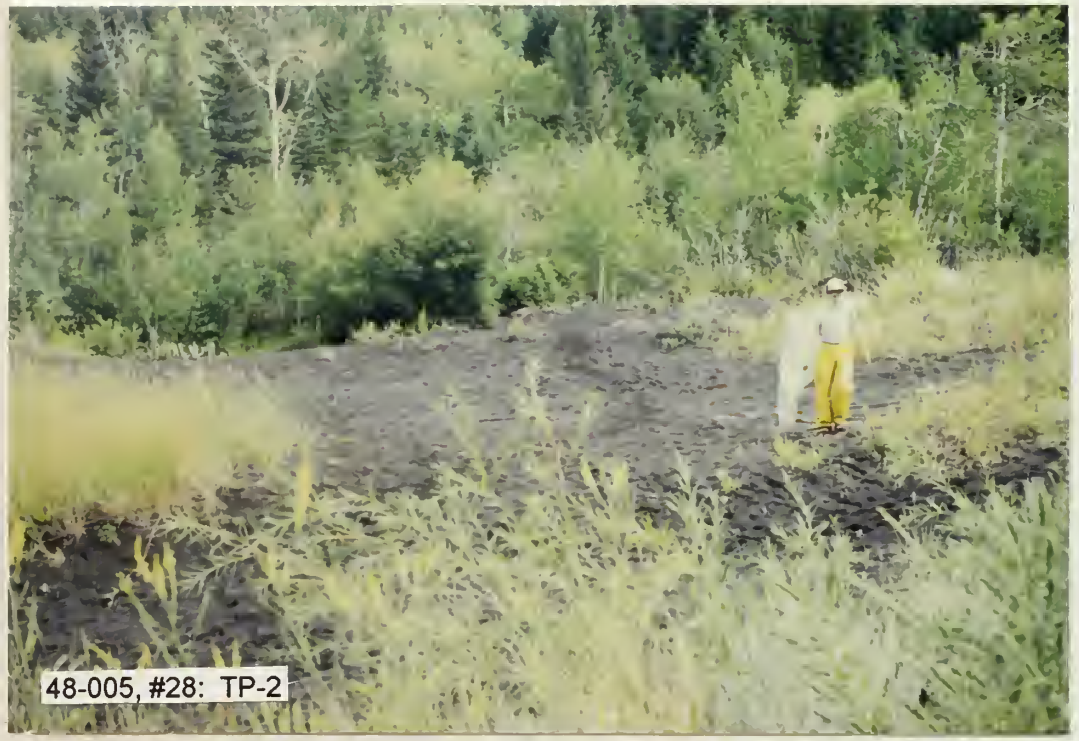
✓Taken From Benbow EA


48-005, #24: Lower mill foundation


48-005, #25: Upper mill foundation


48-005, #26: View of tailings from mill

48-005, #27: TP-1



48-005, #28: TP-2

SWEET GRASS

INDEPENDENCE

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: POORMAN/EMMA PA#: 49-001

Date: August 11, 1993 Time: 1430-1600

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Belanger, Pioneer

Visitors: Earl McCurley, MDSL
Tim Pfahler, MDSL Helicopter Pilot
Joe Garcia, MDSL

Weather/Seasonality Observations: Cloudy; cool; breezy; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #30: WR-1; #31: WR-2; #32: WR-3; #33: WR-4. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): No surface water samples taken except for retained water in shaft.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Fill shaft; grade, amend, and revegetate dump material.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): POORMAN/EMMA PA#: 49-001

Legal Description: T 7S ;R 12E ;Sec. 22 , SW1/4 NE1/4 ___1/4

County: SWEETGRASS Mining District: INDEPENDENCE

Latitude: N 45° 12' 43" Longitude: W 110° 13' 46"

Primary Drainage Basin and Code: East Fork Boulder River/10070002
Secondary Drainage Basin: Unnamed tributary

USGS Quadrangle map name(s): Haystack Peak

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Cowles Mining Co., 430 South Yellowstone, Livingston, MT 59047. (406) 222-0199; Beverly Harris, 2812 1st Avenue N, Billings, MT 59101. (406) 245-3455; Ann Wilcox, 823 Poly Drive, Billings, MT 59102; Gallatin National Forest.

Relationship to other mines/sites in the area/district: Approx. 0.5 mile from NW SE S22 and Yager/Daisy mines.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 9400', Slope 25°,
Aspect Southwestern

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)___

Area of disturbed/unvegetated lands? <1 acres.
Dimensions:___

Predominant vegetation types: Subalpine fir, shrubs, grasses

Access: roads - good X ,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). Short drive above the Yager/Daisy mine

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Greater part of the Boulder River region is underlain by Archean crystallines involved in the Beartooth uplift. The site is located near the divide between the East Fork of the Boulder River and the Main Fork of the Boulder River.

Mining/milling history, ore type/tenor, host rock, gangue: Oxidized ores containing free gold in a siliceous gangue reportedly constituted the greater part of the property's production. The primary ore, auriferous pyrite, is in a quartz gangue.

Mine Operation?

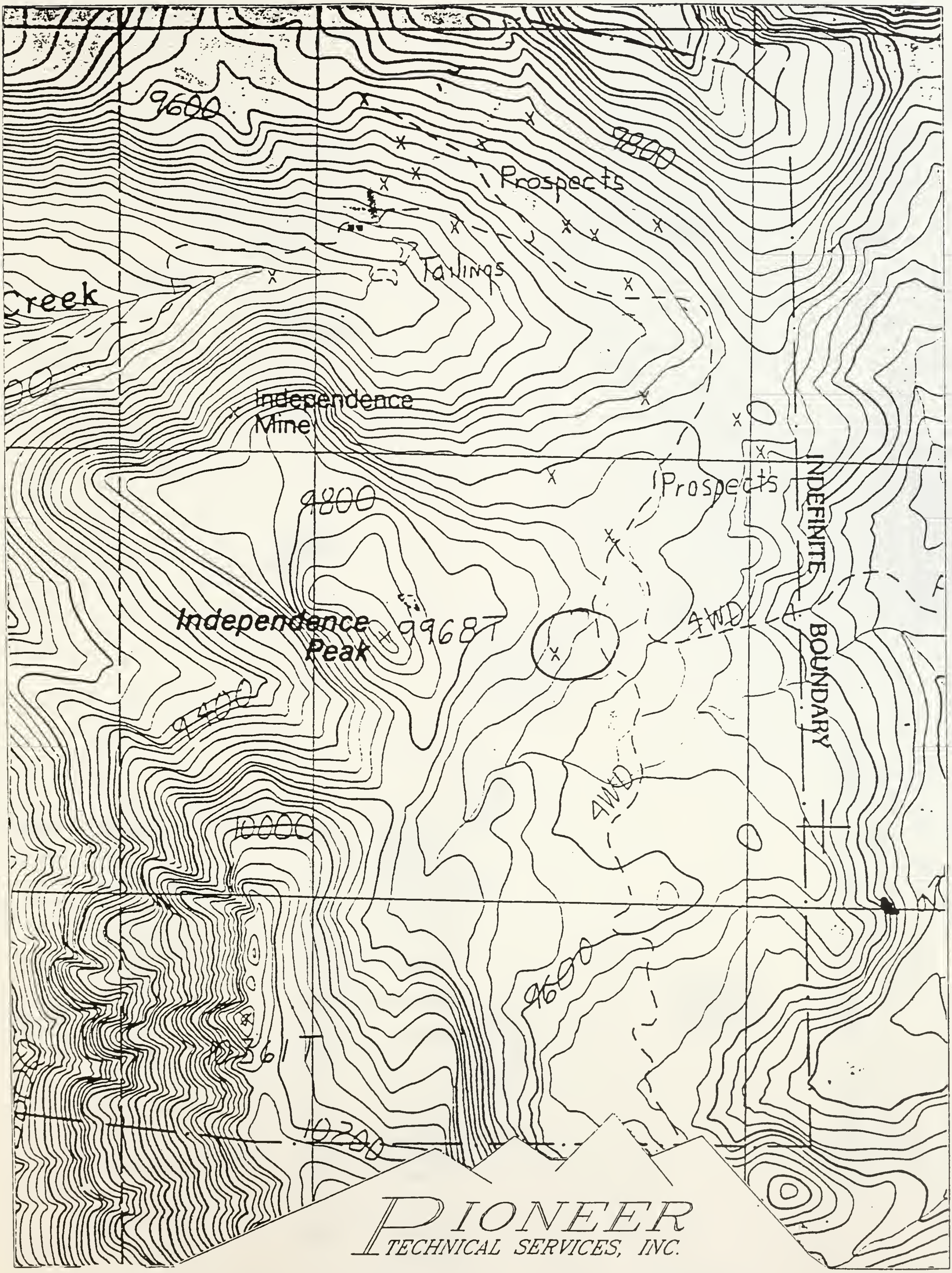
Shafts - Yes X, No ___, # 1, Comment Partially caved
Adits - Yes X, No ___, # 3, Comment All caved
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

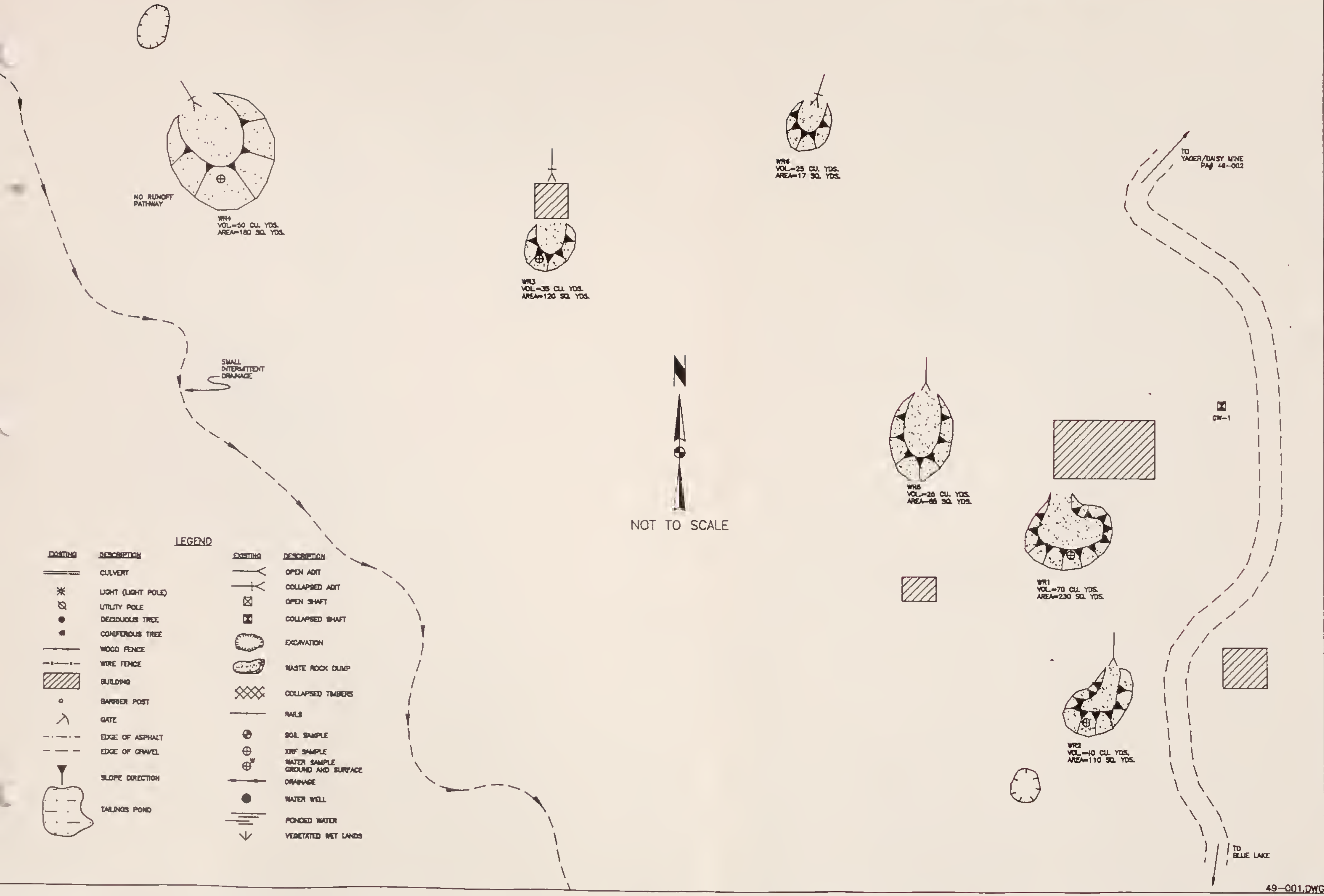
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



POORMAN/EMMA, P.A. NO. 49-001

T07S, R12E, SECTION 22

SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION
═	CULVERT
✳	LIGHT (LIGHT POLE)
⌀	UTILITY POLE
●	DECIDUOUS TREE
✱	CONIFEROUS TREE
—•—	WOOD FENCE
—x—	WIRE FENCE
▨	BUILDING
○	BARRIER POST
⋏	GATE
—·—	EDGE OF ASPHALT
— —	EDGE OF GRAVEL
▼	SLOPE DIRECTION
	TAILINGS POND

EXISTING	DESCRIPTION
—<	OPEN ADIT
—+<	COLLAPSED ADIT
☒	OPEN SHAFT
⊠	COLLAPSED SHAFT
	EXCAVATION
	WASTE ROCK DUMP
XXX	COLLAPSED TIMBERS
—	RAILS
◕	SOIL SAMPLE
⊕	XRF SAMPLE
⊕W	WATER SAMPLE GROUND AND SURFACE
—▸—	DRAINAGE
●	WATER WELL
≡	PONDED WATER
↓	VEGETATED WET LANDS

49-001.DWG

PIONEER
TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN JJP DATE 29 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

POOR MAN / EMMA PA# 49-001
INDEPENDENCE DISTRICT SWEET GRASS COUNTY

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	70	Dump closest to shaft with water	None	6.9 (D)	0.055	49-001-WR-1	08/10/93 1800	T-Metals, ABA
WR-2	WR	40	To southeast of WR-1	None	6.9 (D)	0.04			
WR-3	WR	35	Immediately west of WR-1	None	5.1 (D)	0.04			
WR-4	WR	50	500 feet northwest of WR-3	None	6.6 (D)	0.07			
WR-5	WR	25	Dump between WR-3 and WR-4	None	N/A	N/A	N/A	N/A	N/A
WR-6	WR	25	Dump northeast of WR-5	None	N/A	N/A	N/A	N/A	N/A
SS-1	BKGRND	N/A	Background soil	N/A	N/A	N/A	49-001-SS-1	08/10/93 1545	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 49-001-WR-1 is a composite of WR-1, WR-2, WR-3 and WR-4.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes X , No____, Number: 1 Identification: No dump associated with it

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes___, No X ;
Number of well logs: 0

Distance to nearest well used for drinking? > 4 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Due to uncontained sources containing slightly elevated metals and large amounts of precipitation that may infiltrate through the dumps.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: McCurley

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	SH	Filled shaft	None	6.2	230	159.5	13.8	19	N/A	49-001-GW-1	08/10/93 1730	T-Metals, TDS, Hardness, SO4, Cl, NO2/NO3
GW-2	SH	Duplicate of GW-1	None	6.2	230	159.5	13.8	19	N/A	49-001-GW-2	08/10/93 1745	T-Metals, TDS, Hardness, SO4, Cl, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ___

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No____, Name(s): Small intermittent drainage approximately 200 feet from WR-4

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:____________, Average Flow:____________

Distance between waste source(s) and nearest surface water body (ft)? Approximately 200 feet to WR-4

Surface water draining onto or through waste sources: Yes____, No X ,
Describe: Runoff only

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, stock watering, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?_________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 5+ acres

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1.5 miles (recreational)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3	Partial	2,070	2,070	Yes	Low
WR-2	SO3	Partial	990	940	Yes	Low
WR-3	SO3; pH	Dry	1,100	990	Yes	Low
WR-4	SO3	Dry	1,620	1,620	Yes	Low
WR-5	None	Dry	585	585	Yes	Low
WR-6	None	Dry	155	155	Yes	Low

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X , Describe:

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes X , No___, Describe: Off-road vehicle tracks

Accessibility - Fences, warning signs, closed roads? Accessible by 4x4.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment
Wilderness Area - Yes___, No X , Comment
T&E Species Habitat - Yes___, No X , Comment
Bat Habitat - Yes___, No X , Comment

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - 2
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 1 , types and locations: Open shaft

Hazardous structures: Yes X , No___, Number 2 , types and locations: Old cabins

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:

Unstable waste piles, impoundments, undercut banks: Yes____, No X , Number____, types and locations:

Fire and/or Explosion hazards: Yes___, No X , Explain:

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Poorman/Emma, Prepared by Northern Engineering and Testing, August 21, 1987.

USGS, Topographic Map, Haystack Peak, Montana, 7 1/2 minute Quadrangle, 1987.

USGS/USBM, Mineral Resources of the North Absaroka Study Area, Park and Sweetgrass Counties, Montana, Open File Report 77-700, 1977.

LABORATORY ANALYTICAL DATA

POORMAN/EMMA
PA NO. 49-001

Poor Man/ Emma PA# 49-001
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BULLOCK
INVESTIGATION DATE: 08/11/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
49-001-WR-1	270	103 J	1.57 J	24.6	21.5	292	27800	0.323	637	42.5	399	5.79 UJ	273	NR
BACKGROUND	16.3	78.3 J	0.68 J	13.5	45.6	40.1	28500	0.063	612	24	37.2	7.97 UJ	99	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
49-001-WR-1	0.07	2.19	8.60	6.42	0.03	<0.01	0.04	0.00	8.60

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
49-001-GW-1	2.03	19	2.57 U	9.7 U	6.83 U	3.2	22.8	0.12 U	36.2	12.7 U	1.07 J	30.7 U	10.3	19.3
49-001-GW-2	4.2	17.1	2.57 U	9.7 U	6.83 U	1.9 J	48.2	0.120 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	18.4

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
49-001-GW-1	56	5.0	9	0.05	NR
49-001-GW-2	61	5.0	6	0.06	NR

LEGEND

WR1 – Composite of subsamples WR1, 2, 3, and 4.
BACKGROUND – From the Poorman/Emma Mine (49-001-SS-1).
GW1 – Filled shaft.
GW2 – Duplicate of the sample 49-001-GW-1.

XRF ANALYSIS RESULTS

POORMAN/EMMA
PA NO. 49-001

Mine Name: Poor Man/Emma PA# 49-001
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
49-001-SS-1		14695	13271.1	3141.64		1252.1	34594.7			131.348 *	57.1978 *	669.539
49-001-WR-1		7248.79	35815.2	1116.52	257.125 *	2103.04	46522.3			132.215 *	105.421 *	1160.63
49-001-WR-1-COMP		12371.8	21145.6	2613.66	267.865 *	1834.52	56297.9		348.404	368.069	282.254	958.807
49-001-WR-2		10709.5	26127.1	3029.19	222.369 *	1151.42	58024.5		917.681	438.673	108.291 *	904.836
49-001-WR-3		15855.1	15515.2	2941.45		1086.09 *	56777.1	412.532 *	98.6747 *	707.136	472.852	845.594
49-001-WR-4		18630.8	12952.1	2630.54		2920.35	90488.9	732.19 *	300.871	296.55	783.05	854.688

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
49-001-SS-1	207.683				111.094			772.343			18.2312 *
49-001-WR-1	35.4033			54.2781 *	48.0527			459.946			15.4974 *
49-001-WR-1-COMP	106.704		4.94415 *	212.463	79.1379			902.548			19.1202 *
49-001-WR-2	130.48		6.28983 *	177.684	60.2796			876.521			18.8377 *
49-001-WR-3	182.33		7.38122 *	621.37	123.358			1274.5			22.4443 *
49-001-WR-4	200.612		13.1384 *	285.767	139.235			1474.27			17.4328 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

POORMAN/EMMA
PA NO. 49-001

AIMSS SCORESHEET

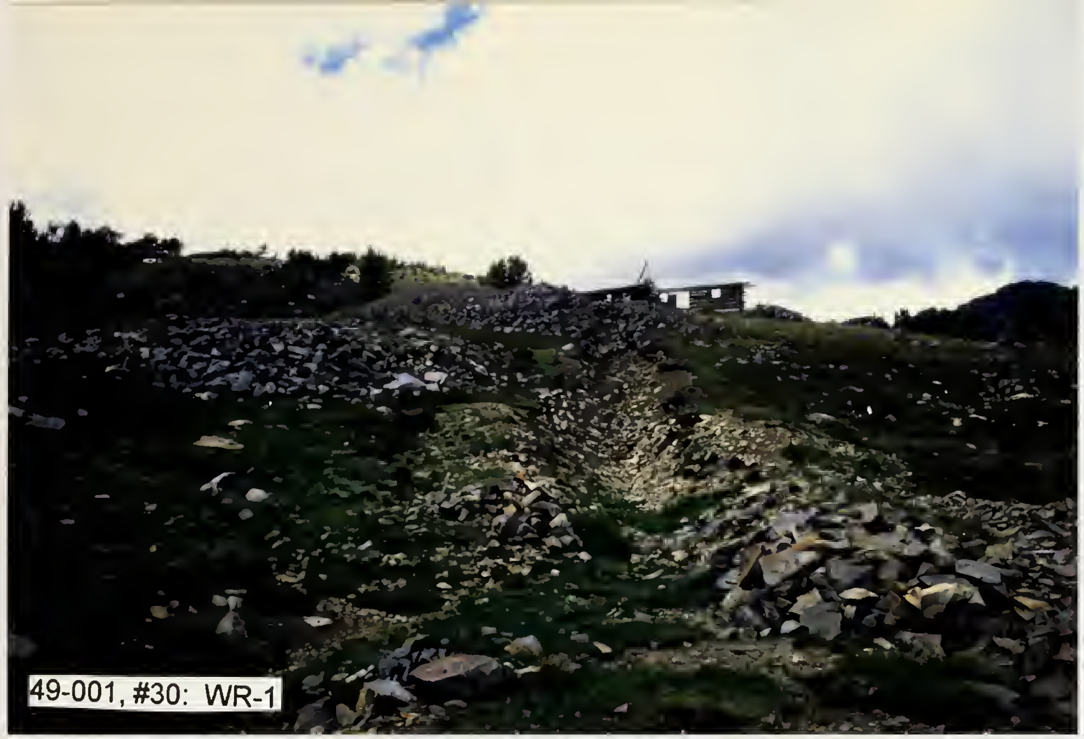
SITE NAME: POORMAN/EMMA
PA NUMBER: 49-001

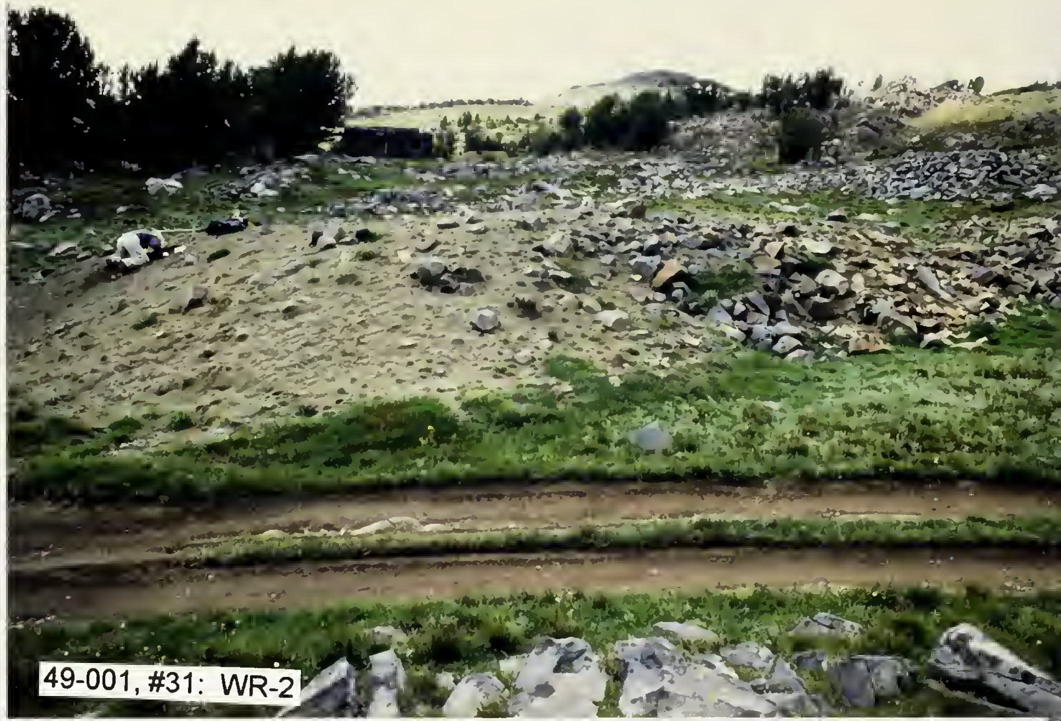
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.064
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.068
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19		FISHERY		10
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	46
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C.		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.007
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	1
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.006
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	2
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			0.00

SITE NAME: POORMAN/EMMA
PA NUMBER: 49-001

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	180
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**7.20**


49-001, #30: WR-1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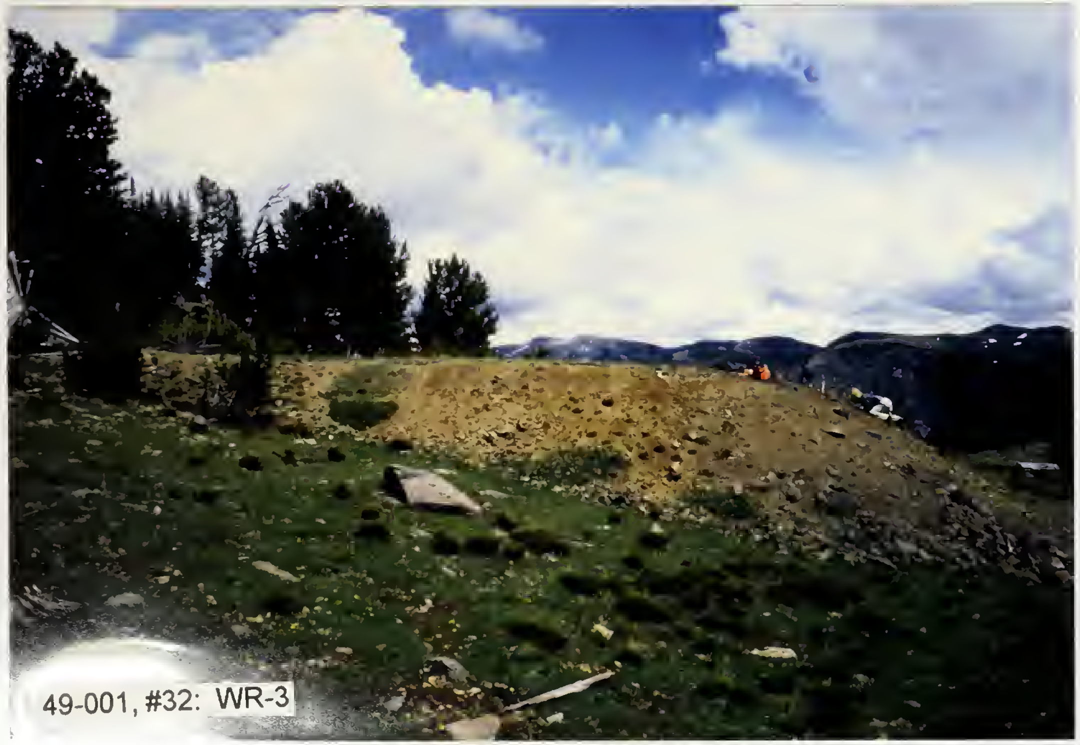
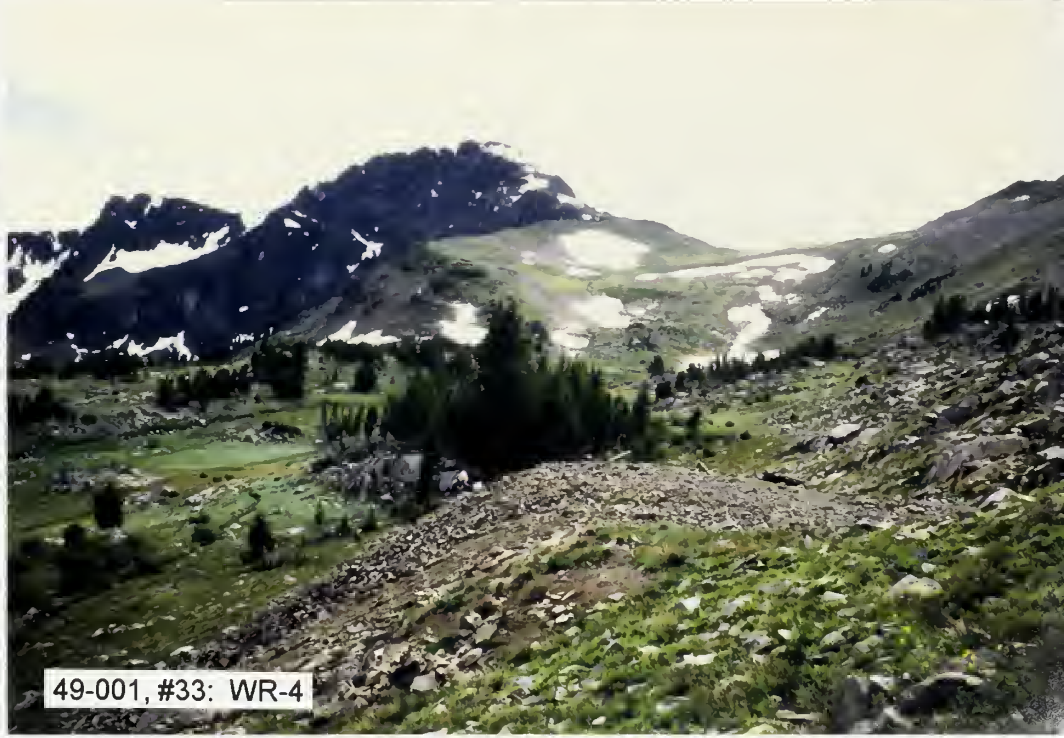

49-001, #32: WR-3


49-001, #33: WR-4

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: YAGER/DAISY **PA#:** 49-002

Date: August 11, 1993 **Time:** 0800-1430

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: Earl McCurley, MDSL
Joe Garcia, MDSL
Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Scattered showers; slight breeze; approximately 60°F; cool, wet summer and spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #18: SW-1 sample location in Basin Creek; #19: Mine from the northwest; #24: SW-2 sample location in Basin Creek; #25: WR-3 caved adit and discharge; #26: WR-4, -5 and -6 and TP-1 area; #27: WR-5 with loadout; #28: GW-4 sample location; #29: WR-2C location and wooden ore shoot.
Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Definite water quality impacts were observed.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Study water treatment alternatives. Remove waste materials from drainages; grade, amend, and revegetate dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): YAGER/DAISY PA#: 49-002

Legal Description: T 7S ;R 12E ;Sec. 15 , NE1/4 SW1/4 1/4

County: SWEETGRASS Mining District: INDEPENDENCE

Latitude: N 45° 13' 17" Longitude: W 110° 13' 10"

Primary Drainage Basin and Code: Boulder River/10070002
Secondary Drainage Basin: Basin Creek

USGS Quadrangle map name(s): Haystack Peak

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Cowles Mining Co., 430 South Yellowstone, Livingston, MT 59047. (406) 222-0199; Gallatin National Forest, P.O. Box 130, Bozeman, MT 59771.

Relationship to other mines/sites in the area/district: NW SE S22 (49-003) is immediately south of site across drainage and Poorman/Emma is southeast of the site approximately 1 mile.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 9700' , Slope 18-20° , Aspect North to Northeast

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 1.5 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine, Subalpine fir, willows, mosses, grasses

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). On a road that also leads to the Poorman/Emma site.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on north side of intermittent Basin Creek. Basin Creek flows west past the mine site to is confluence with the perennial Boulder River 1.4 miles away.

Mining/milling history, ore type/tenor, host rock, gangue: Inspection of the waste dumps indicated that the vein system contained both oxidized and pyritic gold ores in a siliceous gangue. No other information available.

Mine Operation?

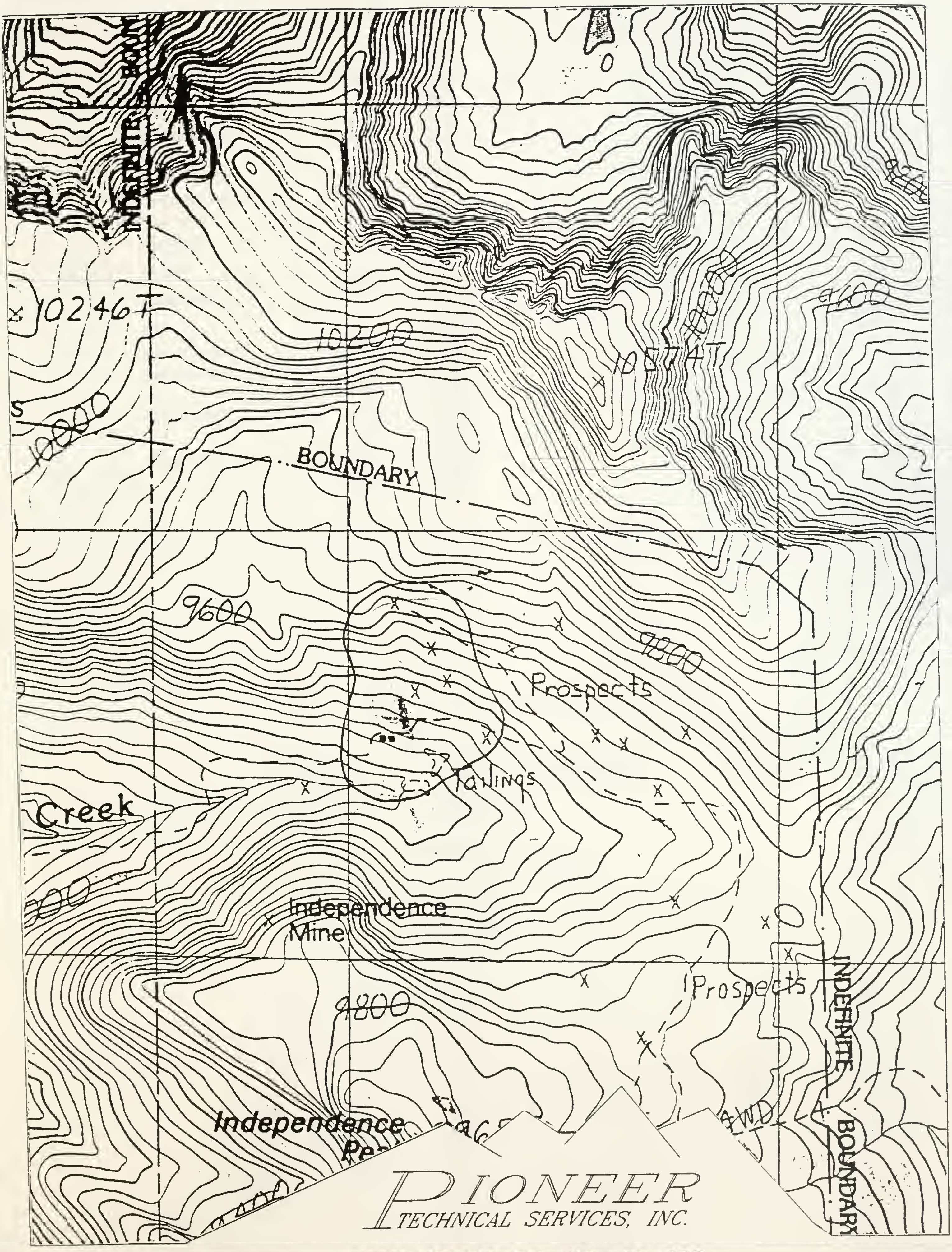
Shafts - Yes X, No ___, # 1, Comment Open
Adits - Yes X, No ___, # 6, Comment All caved
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill X Dedicated Mill ___; Number and names of mines that supplied mill feed: May have been supplied by Poorman/Emma, NW SE S22, and Independence Mines.

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Floatation

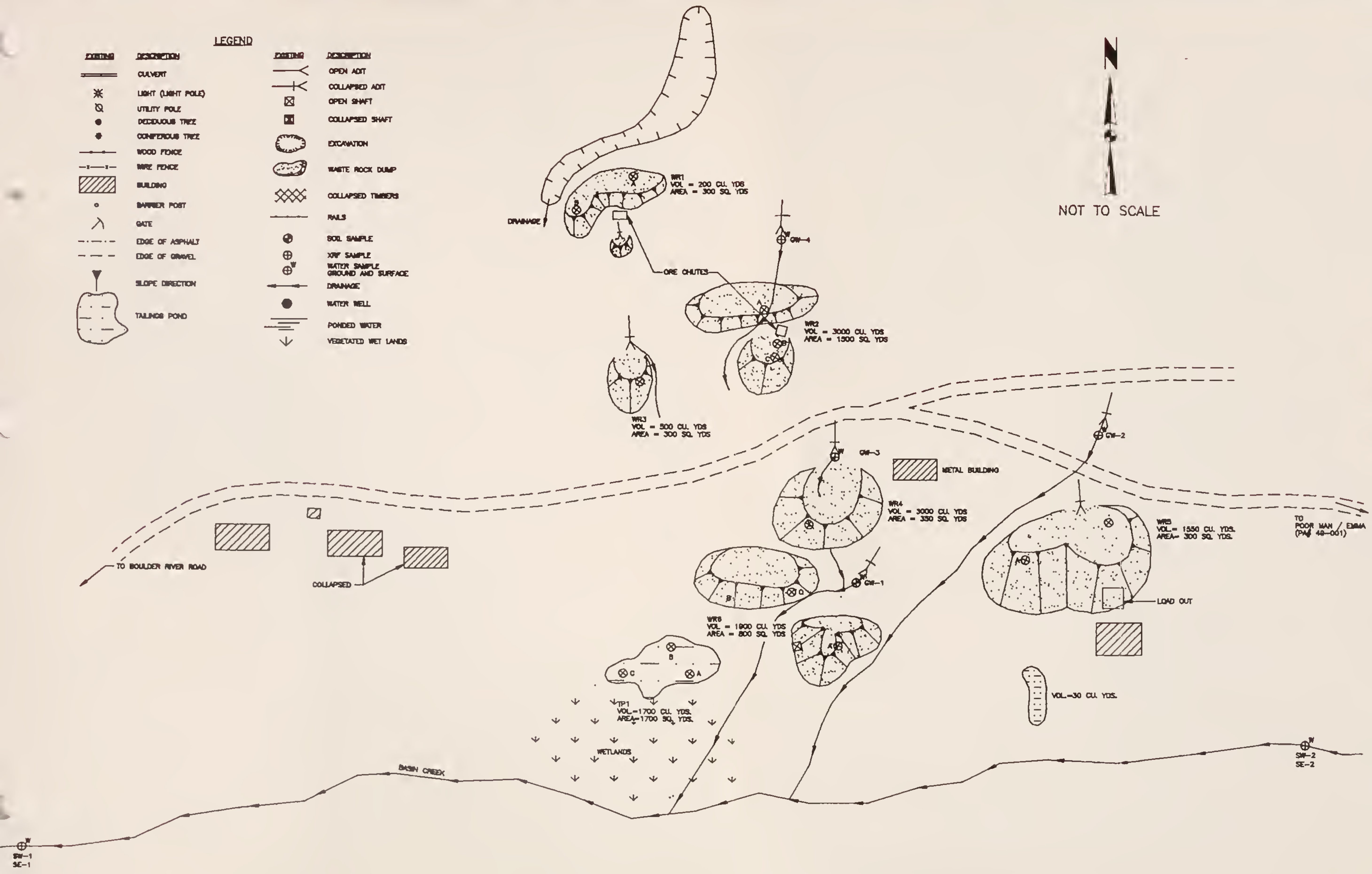


PIONEER
TECHNICAL SERVICES, INC.

YAGER/DAISY, P.A. NO. 49-002

T07S, R12E, SECTION 15

SCALE: 1" = 1000'



PIONEER TECHNICAL SERVICES INC. BUTTE MT.

DRAWN JTP DATE 9 DEC 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

TDSH
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS—BOZEMAN—KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

YAGER / DAISY PA# 49-002
INDEPENDENCE DISTRICT SWEET GRASS COUNTY

SHEET NO.

49-002.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 70% sand, 30% silt

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Maximum depth of tailings appears to be 3.5 feet.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundments are present.

Comments on potential for mitigation: Remove from drainage/wetlands.

SOURCE INVENTORY FORM

SAMPLERS: Bullock, Belanger, Clark

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAILS	1,700	East end; 0-2', orange sand	None	4.0 (D)	0.04	49-002-TP-1	08/11/93 1656	T-Metals, ABA
TP-1A-B	TAILS		2-2.5', gray sand	None	< 3.5 (D)	0.05	49-002-TP-2	08/11/93 1700	T-Metals, ABA
TP-1A-C	TAILS		2.5', peat	None	< 3.5 (D)	0.04			
TP-1B-A	TAILS		Northwest end; 0-0.75', orange sand	None	4.2 (D)	0.04			
TP-1B-B	TAILS		0.75-3', gray/tan sand	None	< 3.5 (D)	0.04			
TP-1B-C	TAILS		3-3.5', dark gray sand	None	< 3.5 (D)	0.04			
TP-1C-A	TAILS		Southwest end; 0-1.5', tan sand	None	< 3.5 (D)	0.04			
TP-1C-B	TAILS		1.5-3', dark gray sand	None	< 3.5 (D)	0.04			
WR-1A	WR	200	West end, just north of trench on top	None	4.2 (D)	0.06	49-002-WR-1	08/11/93 1620	T-Metals, ABA
WR-1B	WR		East end, just north of trench on top	None	< 3.5 (D)	0.04			
WR-2A	WR	3,000	Upper portion of WR-2, southeast of ore shoot	None	6.7 (D)	0.04			
WR-2B	WR		Just north of ore shoot on lower WR-2 on top	None	5.3 (D)	0.04			
WR-2C	WR		North of WR-2B near edge of lower WR-2	None	< 3.5 (D)	0.05	49-002-WR-2	08/11/93 1630	T-Metals, ABA
WR-3A	WR	500	Just off of knob on WR-3	None	4.1 (D)	0.05			
WR-4A	WR	3,000	Dump west of metal building	None	4.2 (D)	0.04			
WR-5A	WR	1,550	Dump east of metal building	None	5.7 (D)	0.04			
WR-5B	WR		Dump east of metal building	None	5.5 (D)	0.05			
WR-6A	WR	1,550	On southern lobe of WR-6, east of shaft	None	6.7 (D)	0.04			
WR-6B	WR		Upper pile on west side of top	None	5.2 (D)	0.04			
WR-6C	WR		Upper pile on east side	None	< 3.5 (D)	0.05			

*D-Direct reading(Kelvey Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 49-002-TP-1 is a composite of TP-1A-A, 1B-A, 1C-A; 49-002-TP-2 is a composite of TP-1A-B, 1B-B, 1C-B; 49-002-WR-1 is a composite of WR-1A, 1B, 2A, 2B, 3; 49-002-WR-2 is a composite of WR-2C, 4A, 5A, 5B, 6A, and 6B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 4 Identification: Caved adit above WR-4; adit between WR-6 upper and lower; adit above WR-2 and adit above WR-5

Filled shafts: Yes___, No X , Number:____ Identification:______

Seeps/Springs: Yes___, No X , Number:____ Identification:______

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 1

Distance to nearest well used for drinking? 4.7 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable X , Possible____, Unlikely____.
Groundwater present on site; metal values in dumps are elevated.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW' cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	AD	Adit above lower WR-6A	15 gpm (E)	6.85	110	133	6.9	14	N/A	49-002-GW-1	08/11/93 1315	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-2	AD	Adit above WR-5	10 gpm (E)	7.28	70	129	5.3	7	N/A	49-002-GW-2	08/11/93 1330	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-3	AD	Adit above WR-4	5 gpm (E)	6.99	170	62.4	6.1	9	N/A	49-002-GW-3	08/11/93 1345	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
GW-4	AD	Adit above WR-2	6 gpm (M)	3.78	190	55	4.2	7	N/A	49-002-GW-1	08/11/93 1300	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Basin Creek

Dry streambeds: Yes ____, No X, Name(s): ____

Other surface water: Yes ____, No X, Name(s)/Description: ____

Waste materials within any floodplain: Yes X, No ___ Source ID(s): TP-1

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 1.5 during investigation
High Flow: 20 cfs, Average Flow: 2 cfs

Distance between waste source(s) and nearest surface water body (ft)? TP-1 is in active floodplain within 50 feet of present channel.

Surface water draining onto or through waste sources: Yes X, No ____,
Describe: Adit discharges flow through waste rock dumps.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fisheries, stock watering, irrigation, T&E species

Observed erosional/sedimentation/stream turbidity problems? Yes X, No _____, Distance downstream (ft)? 1000+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Iron-staining

SURFACE WATER INVENTORY FORM

SAMPLERS: Bullock, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	In Basin Creek, downgradient from site	7.41	70	145	9.2	10	2.01 cfs (M)	49-002-SW-1	08/11/93 1200	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	In Basin Creek, downgradient from site	N/A	N/A	N/A	N/A	N/A	N/A	49-002-SE-1	08/11/93 1200	T-Metals
SW-2	SW	In Basin Creek, upgradient of site	7.16	80	160	9.0	10	.825 cfs (M)	49-002-SW-2	08/11/93 1220	T-Metals, TDS, Hardness, SO4, NO2/NO3
SE-2	SE	In Basin Creek, upgradient of site	N/A	N/A	N/A	N/A	N/A	N/A	49-002-SE-2	08/11/93 1220	T-Metals
SE-3	SE	500 feet below SE-1 sample	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-4	SE	1000 feet below SE-1 sample	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Sediments were iron-stained at both 500 feet and 1000 feet.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approximately 5 acres

Wetlands present: Yes X , No____, Describe: Approximately 5 acres of wetlands present in tailings pond-area

Carbonate rocks/soils: Yes X , No___, Describe: None observed on dump but some limestone cliffs were observed in canyon below Basin Creek, on the Boulder River.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1.5 miles (recreational)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock, Belanger, Clark

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	pH; SO3	Dry	2,700	2,700	Yes	Low
WR-2	pH; SO3	Partial	13,500	13,500	Yes	Low
WR-3	pH; SO3	Partial	2,700	1,620	Yes	Low
WR-4	pH; SO3	Partial	3,150	3,150	Yes	Low
WR-5	pH; SO3	Dry	2,700	2,160	Yes	Low
WR-6	pH; SO3	Partial	7,200	7,200	Yes	Low
TP-1	pH	Wet	15,300	13,770	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments_None____________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_______ Many backpackers have used cabin on mine.

Accessibility - Fences, warning signs, closed roads?_Unrestricted; roads are difficult to travel.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____________________
Wilderness Area - Yes___, No_X_, Comment____________________
T&E Species Habitat - Yes___, No_X_, Comment____________________
Bat Habitat - Yes___, No_X_, Comment____________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _Not Rated_
Sport Fishery Classification - _Not Rated_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___ Open shaft at WR-6

Hazardous structures: Yes_X_, No___, Number_4_, types and locations:_ Two loadouts, one mill, and one cabin

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_6_, types and locations:_Waste rock dumps have steep slopes.

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_6_, types and locations:_Waste rock dumps

Fire and/or Explosion hazards: Yes___, No_X_, Explain:____________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Yager/Daisy, Prepared by Northern Engineering and Testing, August 20, 1987.

USGS, Topographic Map, Haystack Peak, Montana, 7 1/2 minute Quadrangle, 1987.

USGS/USBM, Mineral Resources of the North Absaroka Study Area, Park and Sweetgrass Counties, Montana, Open File Report 77-700, 1977.

LABORATORY ANALYTICAL DATA

YAGER/DAISY
PA NO. 49-002

Yager/Daisy PA# 49-002
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BULLOCK
INVESTIGATION DATE: 08/11/93

SOLID MATRIX ANALYSES

Metals in soils   Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
49-002-SE-1	5.66	49.2 J	0.54 UJ	5.8	17.7	58.8	12100	0.031 U	205	12.2	50.5	6.44 UJ	49.3	NR
49-002-SE-2	5.21 U	45.8 J	0.57 UJ	9.28	17.7	61.6	13200	0.031 U	307	16.6	109	6.78 UJ	82.8	NR
49-002-TP-1	138	122 J	0.56 UJ	2.73	6.13	95.4	29300	1.91	24.8	6.87	700	6.72 UJ	82.2	NR
49-002-TP-2	19.6	82.4 J	1.31 J	7.82	8.82	65	25300	31.9	99	12	226	5.76 UJ	64	NR
49-002-WR-1	59.1	140 J	2.92 J	31	9.42	168	56900	0.644	627	24.5	2520	5.91 UJ	296	NR
49-002-WR-2	30.8	155 J	0.88 J	12.1	17.4	160	41400	23.5	199	18.9	389	5.77 UJ	40.4	NR
BACKGROUND	16.3	78.3 J	0.68 J	13.5	45.6	40.1	28500	0.063	612	24	37.2	7.97 UJ	99	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
49-002-TP-1	0.60	18.7	-1.05	-19.8	<0.01	0.32	0.48	10.0	-11.0
49-002-TP-2	2.34	73.1	1.83	-71.3	0.53	0.75	1.06	23.4	-21.6
49-002-WR-1	3.59	112	0.86	-111	<0.01	1.65	2.45	51.5	-50.7
49-002-WR-2	2.51	78.4	0.07	-78.3	0.56	0.37	1.58	11.6	-11.5

WATER MATRIX ANALYSES

Metals in Water   Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
49-002-GW-1	1.18 U	37.5	2.57 U	9.7 U	6.83 U	5.37	112	0.12 U	4.08 U	12.7 U	1.33 J	30.7 U	10.1	30.8
49-002-GW-2	1.18 U	33	2.57 U	9.7 U	6.83 U	8.13	11.8 U	0.12 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	18.1
49-002-GW-3	1.18 U	32.9	2.57 U	9.7 U	14.7	186	155	0.12 U	9.17	115	1.22 J	30.7 U	171	51.2
49-002-GW-4	1.18 U	26.3	2.57 U	9.7 U	6.83 U	3.07	1500	0.12 U	92.5	12.7 U	9.37 J	30.7 U	20.5	23.9
49-002-SW-1	1.18 U	24.3	2.57 U	9.7 U	6.83 U	4.53	137	0.12 U	8.43	12.7 U	1.05 J	30.7 U	12.4	14.6
49-002-SW-2	1.18 U	14.5	2.57 U	9.7 U	6.83 U	2.27	15.2	0.12 U	4.08 U	12.7 U	0.75 J	30.7 U	10.3	19.7

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry   Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
49-002-GW-1	71	8.0	22	< 0.05	NR
49-002-GW-2	56	8	9	< 0.05	NR
49-002-GW-3	100	7.0	46	0.06	NR
49-002-GW-4	72	< 5.0	37	0.05	NR
49-002-SW-1	45	6	9	< 0.05	NR
49-002-SW-2	56	13	8	< 0.05	NR

LEGEND

SE1 - In Basin Creek, downgradient from site.
SE2 - In Basin Creek, upgradient of site.
TP1 - Composite of subsamples TP1A-A, 1B-A, and 1C-A.
TP2 - Composite of subsamples TP1A-B, 1B-B, and 1C-B.
WR1 - Composite of subsamples WR1A, 1B, 2A, 2B, and 3.
WR2 - Composite of subsamples WR2C, 4A, 5A, 5B, 6A, and 6B.
BACKGROUND - From the Poor Man/Emma Mine (49-001-SS-1).

GW1 - Adit discharge above lower, waste rock dump 6A
GW2 - Adit discharge above waste rock dump 5.
GW3 - Adit discharge above waste rock dump 4.
GW4 - Adit discharge above waste rock dump 2.
SW1 - Same as sample SE1.
SW2 - Same as sample SE2.

XRF ANALYSIS RESULTS

YAGER/DAISY
PA NO. 49-002

Mine Name: Yager/Daisy PA# 49-002
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
49-002-SE-1000		8863.89	6917.64	1097.04	166.068 *	825.409 *	17750	242.666 *	58.7456 *	91.3872 *	41.4351 *	637.973
49-002-SE-500		10845.5	9448.07	2294.02	172.041 *	829.715 *	22583.9	263.025 *		93.6419 *		649.546
49-002-TP1A-A		18143	2976.16	1962.52			30896.1		63.5966 *	88.9368 *	165.671 *	155.802
49-002-TP1A-B		15990.9	3790.08	1365.43		281.568 *	22069.9			52.1753 *		189.421
49-002-TP1A-C		11675.7	7780.98	2594.6			13619.1		141.124 *	40.1415 *		280.898
49-002-TP1B-A		43180.4	1698.22	1866.63	182.918 *	441.103 *	32969.4	358.001 *	54.6054 *	71.8586 *		239.455
49-002-TP1B-B		13800.7	1706.65	913.197	180.834 *	379.154 *	24106.6			43.7742 *		133.691
49-002-TP1B-C		14308.4	5642.31	1547.01		423.887 *	23134.2		45.7844 *	90.1493 *		496.529
49-002-TP1C-A		21926.4	1137.63	960.016		290.869 *	22957.1	223.246 *	59.0303 *	101.672 *		58.7813
49-002-TP1C-B		16182.1	3698.74	1378.02		289.736 *	23545.8			54.0445 *		323.786
49-002-TP-1-COMP		23001.2	1710.27	1486.26		419.853 *	30119.2		62.2953 *	97.7447 *	66.85 *	153.124
49-002-WR1-A		32867.4	1202.92	802.663	179.004 *	465.317 *	59040.1	465.524 *		75.8076 *		68.4882
49-002-WR1-B		43717.9	1935.52	1027.89	172.094 *		55926.1	420.31 *	65.7056 *	91.3607 *		31.1451
49-002-WR2-A		23344.2	2003.17	931.554	240.878 *	1037.93 *	84351.5	490.5 *	121.6 *	133.248 *		192.06
49-002-WR2-B		17744.5	4852.51	1545.89	244.959 *	556.337 *	59316.4		73.072 *	80.2918 *		347.521
49-002-WR2-C		37598.6	18101.3	1385.91		323.611 *	42577.5	326.105 *				222.817
49-002-WR3-A		26319.4	3718.76	1187.46	209.298 *	4341.94	58519		453.496	974.245		215.636
49-002-WR4-A		22486.1	2925.65	1695.97	204.036 *	548.676 *	62827.2		180.406 *	134.22 *		301.941
49-002-WR5-A		20164	6723.51	1935.81	164.872 *	868.44 *	32055.6	285.458 *	197.552	70.3385 *		527.025
49-002-WR5-B		30860.6	2320.63	1262.9		1205.02	61167.8		308.714	96.7072 *		203.933
49-002-WR6-A		24951.3	6299.99	2316.38		612.34 *	54341.9		106.091 *			553.701
49-002-WR6-B		20176.2	6537.97	1822.25	204.69 *	603.558 *	26727.6		125.313 *	77.4837 *		556.391
49-002-WR6-C		3954.42	1675.19	5297.72			150432	1363.85 *	252.485	154.323		28.9401 *
49-002-WR-1-COMP		32684.7	2613.43	1037.86	199.8 *	1043.08 *	62755.6		142.678 *	271.778		173.239
49-002-WR-2-COMP		26223.5	7562.59	2161.27		627.8 *	47291.9		165.1 *	45.0409 *		407.393

Mine Name: Yager/Daisy PA# 49-002
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
49-002-SE-1000	100.034			40.4045 *	83.8135			1342.79			16.7153 *
49-002-SE-500	117.101			39.6611 *	92.0869			1321.92	90.8049 *		20.9621 *
49-002-TP1A-A	139.246		13.9819 *	461.41	108.791			615.201			22.7749 *
49-002-TP1A-B	144.413		6.68913 *	180.777	111.949			678.219			19.7015 *
49-002-TP1A-C	197.264		5.23729 *	53.7744 *	79.9739			703.098		13.3898 *	14.7593 *
49-002-TP1B-A	160.681		9.71545 *	1537.33	218.85			1036			19.2254 *
49-002-TP1B-B	102.35		11.4466 *	126.763	86.2856			693.279			16.9436 *
49-002-TP1B-C	167.525		5.10012 *	179.778	109.295			1255.88	89.5373 *		25.2986
49-002-TP1C-A	104.901		19.2351	146.866	109.212			524.197	98.4953 *		22.6115
49-002-TP1C-B	155.997		6.3989 *	158.914	104.434			1163.22			22.2569 *
49-002-TP-1-COMP	136.399		13.2213 *	555.631	122.215						
49-002-WR1-A	135.306		39.1421	1344.28	246.454			856.581			22.3173 *
49-002-WR1-B	109.648		62.4474	1533.34	238.554			647.27	120.38 *		24.4155 *
49-002-WR2-A	141.608		110.192	2132.95	172.438			1007.87			22.5817 *
49-002-WR2-B	131.437		11.8843 *	1517.07	107.911			956.32			19.203 *
49-002-WR2-C	154.122			86.5578	203.336			925.17			16.8407 *
49-002-WR3-A	133.269		9.83751 *	2210.53	154.348			1125.93		14.661 *	20.233 *
49-002-WR4-A	151.176		8.47889 *	931.141	153.752		63.7576 *	1109.02			20.1374 *
49-002-WR5-A	160.811		5.12533 *	120.959	117.692			1281.88		10.2775 *	25.7794
49-002-WR5-B	152.154		24.6058	701.32	183.899			891.185			27.3844
49-002-WR6-A	167.356		14.6767 *	79.9214 *	143.757			1516.67			26.9735
49-002-WR6-B	166.616			65.4101 *	104.108			1171.43			25.543
49-002-WR6-C	323.257	550.87		1977.81		256.631 *		504.115			16.2524 *
49-002-WR-1-COMP	126.477		35.5	1999.6	189.387			1063.7			28.0293 *
49-002-WR-2-COMP	158.364		6.19228 *	324	124.965			1257.59			26.8159

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

YAGER/DAISY
PA NO. 49-002

AIMSS SCORESHEET

SITE NAME: YAGER/DAISY
PA NUMBER: 49-002

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.803
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		1
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	1.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	2321
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	450
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.436
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	52132
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.413
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	11
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	227
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.371
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	5
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	278
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.55**

SITE NAME: YAGER/DAISY
PA NUMBER: 49-002

SITE SAFETY

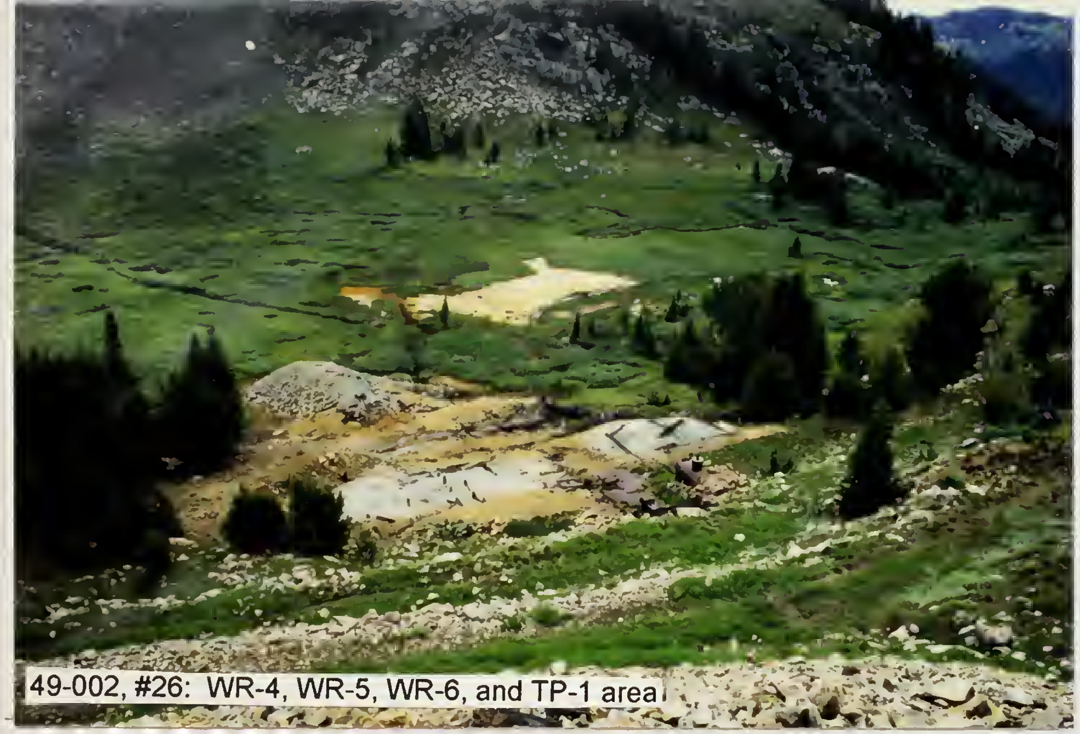
LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	450
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	710
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**71.00**

49-002, #18: SW-1 sample location in Basin Creek

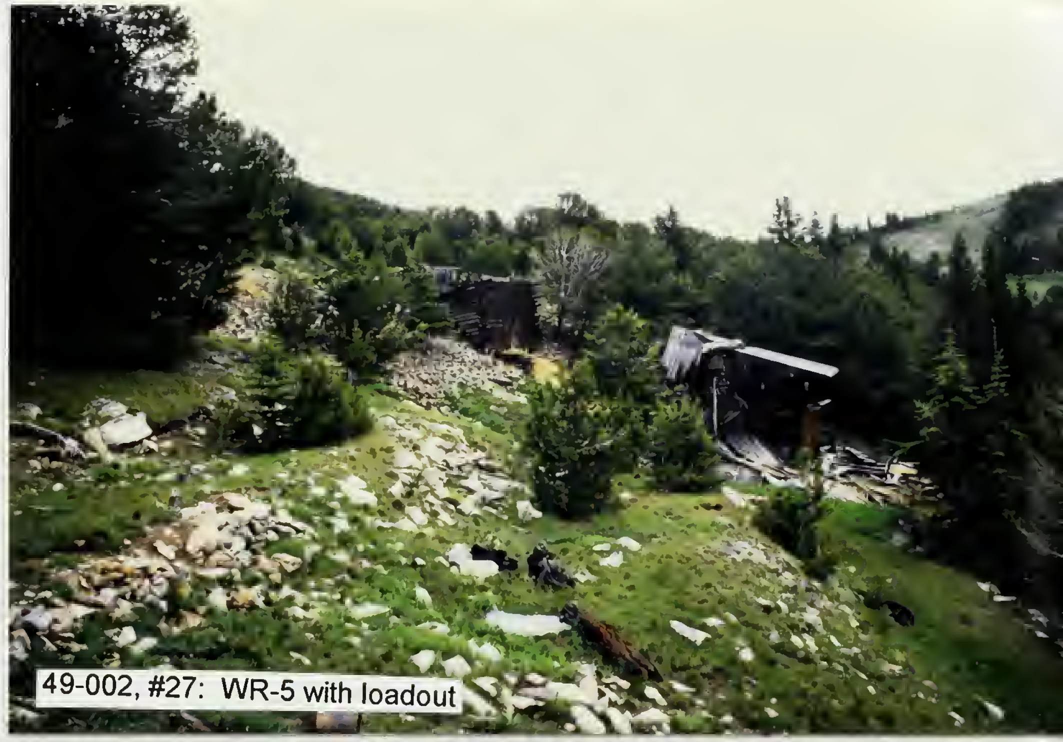
49-002, #19: View of mine from the northwest

49-002, #24: SW-2 sample location in Basin Creek

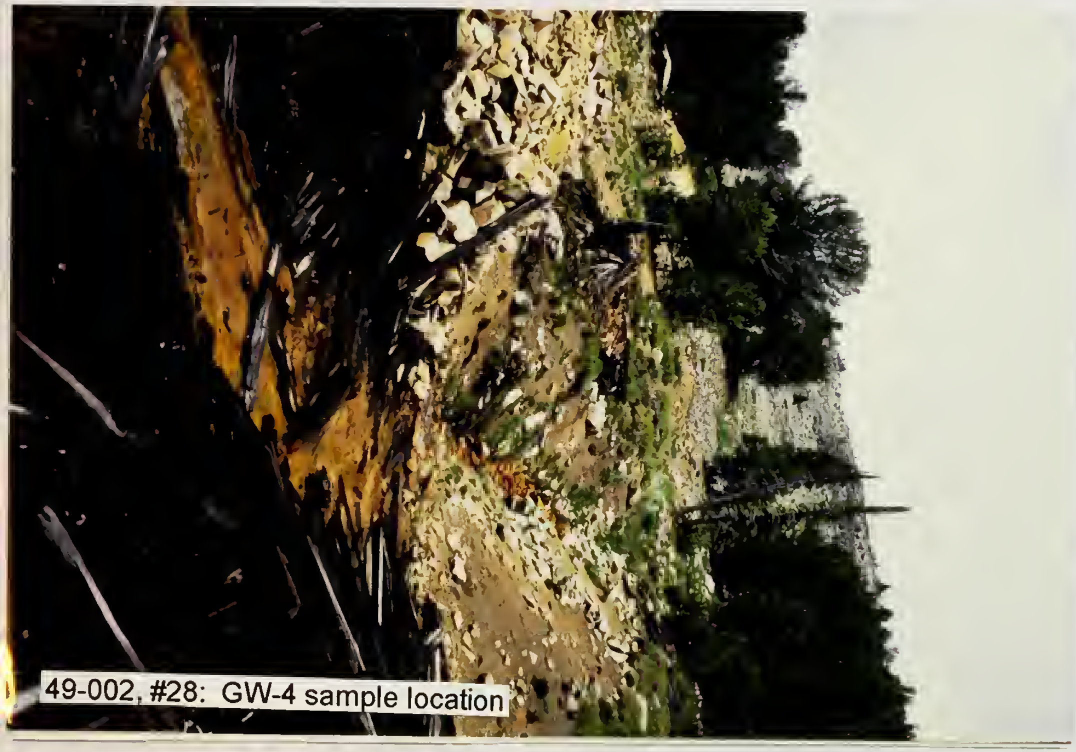
49-002, #25: WR-3 caved adit and discharge



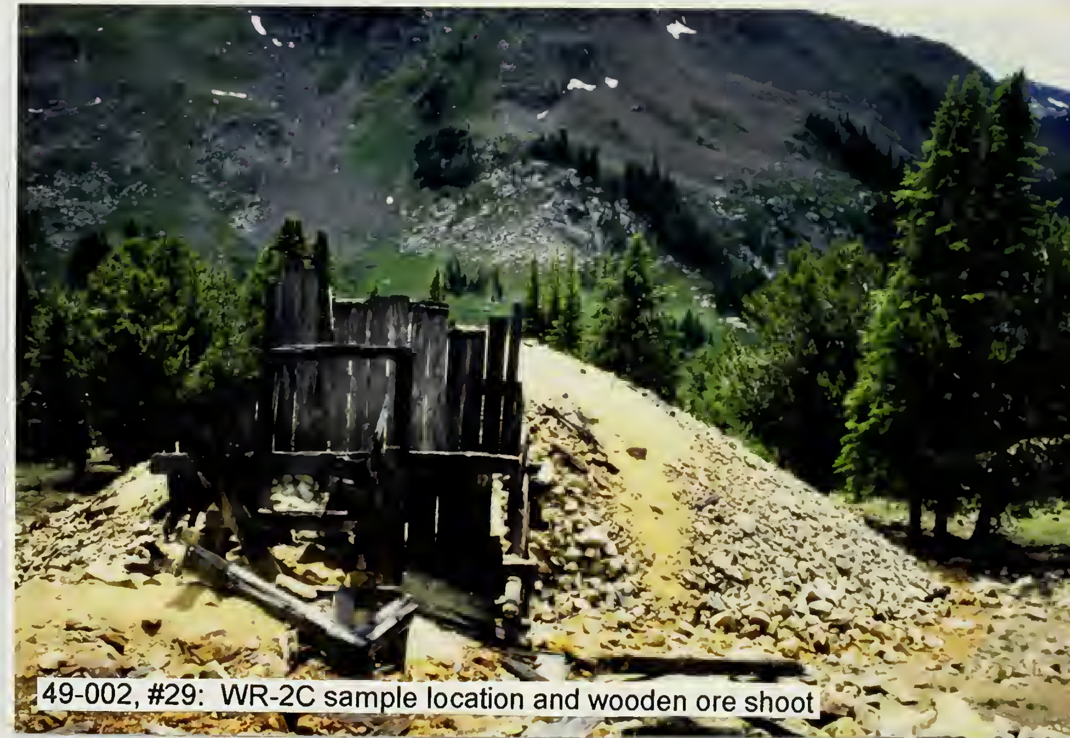
49-002, #26: WR-4, WR-5, WR-6, and TP-1 area



49-002, #27: WR-5 with loadout



49-002, #28: GW-4 sample location



49-002, #29: WR-2C sample location and wooden ore shoot

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NW SE S22 PA#: 49-003

Date: August 11, 1993 Time: 1345

Field Team Leader: Bullock, Pioneer

Sampling Personnel: None

Visitors: None

Weather/Seasonality Observations: Cloudy; rainy; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #20: Adit associated with WR-1; #21: WR-1, facing west; #22: Adit with WR-2; #23 WR-2. Video Tape No. 5

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to site was by helicopter. For a background sample use 49-001-SS-1. No water was present, but water running under a caved open adit could be heard.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: No remedial action appears to be necessary. Investigate possible adit discharge during early spring.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NW SE S22 PA#: 49-003

Legal Description: T 7S ;R 12E ;Sec. 22 , NE1/4 NW1/4 ___1/4

County: SWEETGRASS Mining District: INDEPENDENCE

Latitude: N 45° 13' 03" Longitude: W 110° 13' 08"

Primary Drainage Basin and Code: Boulder River/10070002
Secondary Drainage Basin: Basin Creek

USGS Quadrangle map name(s): Haystack Peak

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned_X_.

Ownership status: Known YX_ N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Arnold Johnson, Box D, Big Timber, MT 59011. (406) 932-4729; Gallatin National Forest, P.O. Box 130, Bozeman, MT 59771.

Relationship to other mines/sites in the area/district: Directly across the valley from the Yager/Daisy Mine and 0.5 mile from Poorman/Emma.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Active exploration in the area

General site features: Elevation 9500' , Slope 32° ,
Aspect North

Land use: Mining_X_, Recreational_X_, Residential___, Urban___,
Agricultural_X_, Other(Specify)

Area of disturbed/unvegetated lands? 0.20 acres.
Dimensions:

Predominant vegetation types: Subalpine, shrubs, willows, grasses

Access: roads - good___,poor___,4wd_X_,trail___.
Other logistical considerations (proximity to other sites). Must walk approx. 1,200 feet from road.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site appears to be underlain by quartz monzonite.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment___

Adits - Yes X, No___, # 3, Comment 1 open

Pits - Yes___, No X, # ___, Comment___

Placers - Yes___, No X, # ___, Comment___

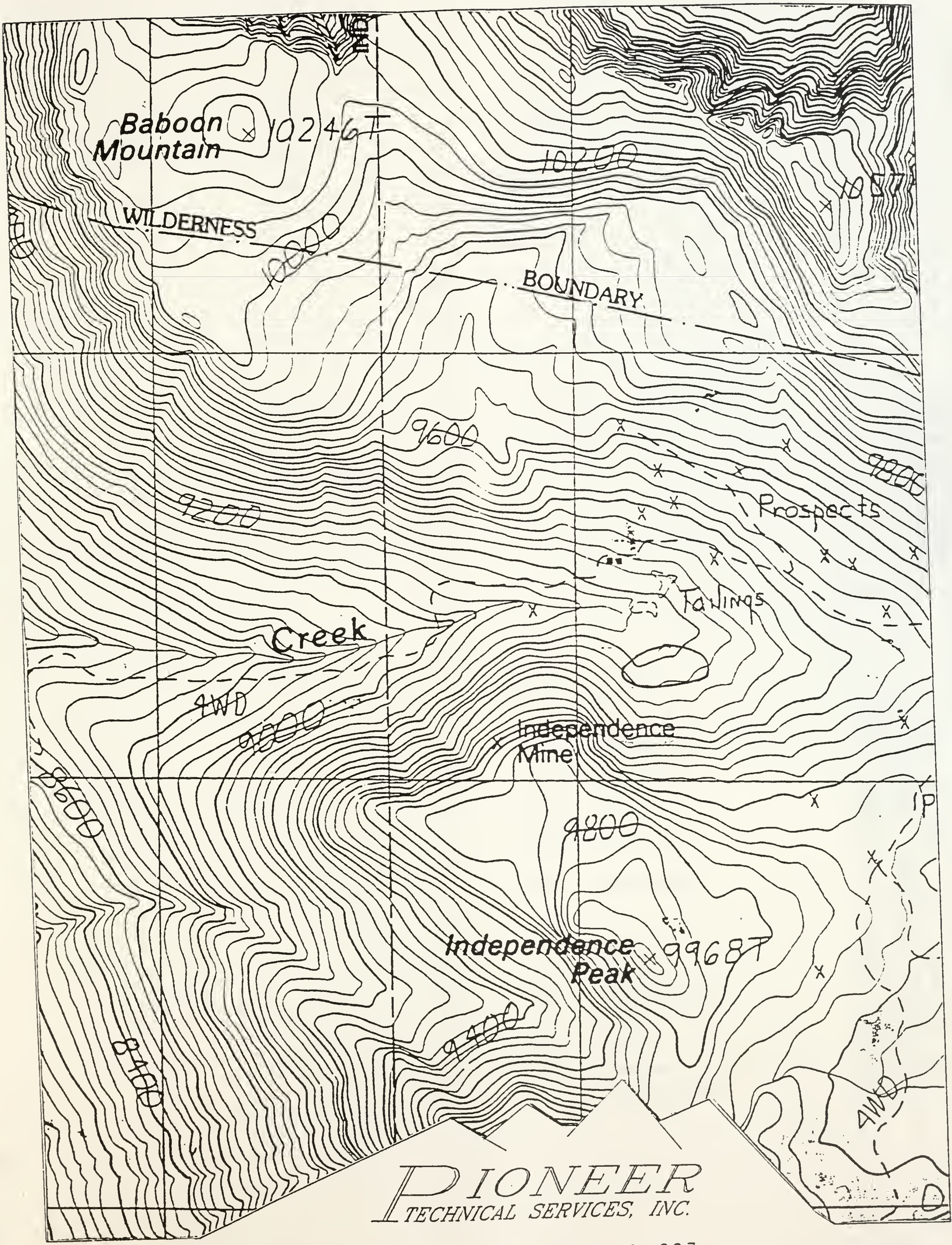
Other - Yes___, No X, # ___, Comment___

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

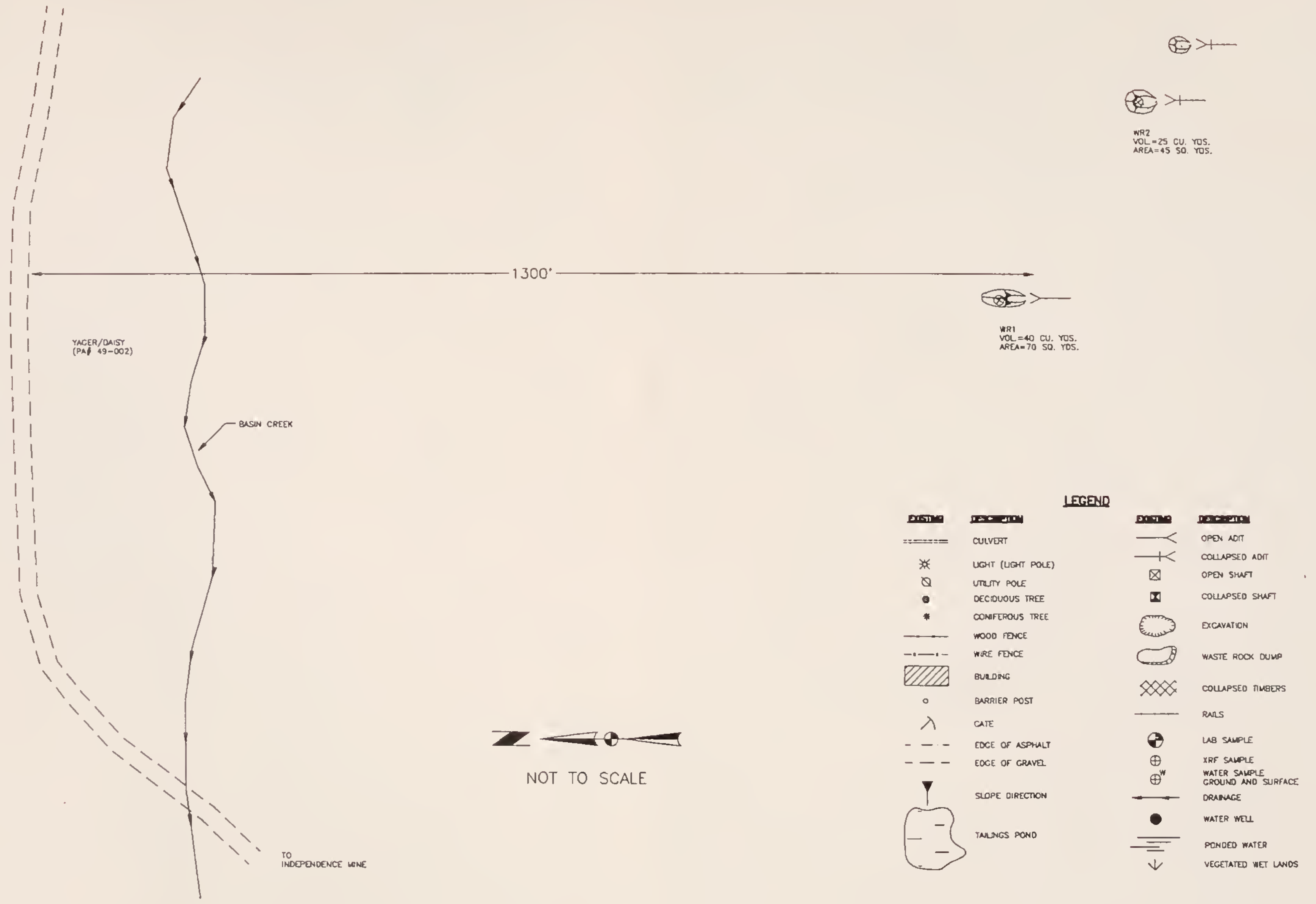
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? N/A



PIONEER
TECHNICAL SERVICES, INC.

NW SE S22, P.A. NO. 49-003

T07S, R12E, SECTION 22



DRAWN JTP DATE 9 DEC 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER
TECHNICAL SERVICES, INC., BUTTE, MT

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
NW SECTION 22 PA# 49-003
INDEPENDENCE DISTRICT SWEET GRASS COUNTY

1 SHEETS
SHEET NO. 1

49-003.DWG

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	40	Top of dump	None	6.4 (D)	0.03	49-003-WR-1	08/11/93 1750	T-Metals, ABA
WR-2A	WR	25	Above toe of dump	None	6.6 (D)	0.035			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 49-003-WR-1 is an equal part composite of WR-1A and WR-2A.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes___, No_X_;
Number of well logs:_0_____

Distance to nearest well used for drinking?_4.8 miles________

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Low metals in dump, but water is flowing under caved adit; uncontained sources.

Other observations/notes:_N/A________

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s): Basin Creek is approximately 900 feet from this site in the valley bottom, but is not impacted.

Dry streambeds: Yes____, No X , Name(s):____

Other surface water: Yes____, No X , Name(s)/Description:____

Waste materials within any floodplain: Yes____, No X Source ID(s):____

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:____, Average Flow:____

Distance between waste source(s) and nearest surface water body (ft)? Approximately 900 feet to Basin Creek

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, agricultural

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X , Distance downstream (ft)?____ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):____

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 acre

Wetlands present: Yes X , No ____, Describe: Wetlands below site (wetlands associated with Yager/Daisy)

Carbonate rocks/soils: Yes ___, No X , Describe: ____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X ; 10-30 ___; 30-100 ___; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments ____

Nearest residence(ft or miles)? 1.5 miles (recreational)

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Bullock

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; FEOX	Dry	530	630	No	None
WR-2	None	Dry	400	400	No	None

Notes and Clarifications: ____________________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No__X__, Describe:______________________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments__None______________________________

Evidence of recreational use on site: Yes___, No__X__, Describe:__________

Accessibility - Fences, warning signs, closed roads?__Unrestricted__

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No__X__, Comment__________
Wilderness Area - Yes___, No__X__, Comment__________
T&E Species Habitat - Yes___, No__X__, Comment__________
Bat Habitat - Yes___, No__X__, Comment__________

Primary Drainage___; Secondary Drainage__X__; No Information___:

Riparian Habitat Quality - High__X__, Medium___, Low___
Wetlands Frontage - High___, Medium__X__, Low___
Fisheries Habitat and Species Classification - __Not Rated__
Sport Fishery Classification - __Not Rated__

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes__X__, No___, Number__1__, types and locations:___
Open adit______________________________

Hazardous structures: Yes___, No__X__, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No__X__, Number____, types and locations:______________________________

Unstable waste piles, impoundments, undercut banks: Yes____, No__X__, Number____, types and locations:______________________________

Fire and/or Explosion hazards: Yes___, No__X__, Explain:______________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for NW SE S22, Prepared by Northern Engineering and Testing, August 13, 1987.

USGS, Topographic Map, Haystack Peak, Montana, 7 1/2 minute Quadrangle, 1987.

USGS/USBM, Mineral Resources of the North Absaroka Study Area, Park and Sweetgrass Counties, Montana, Open File Report 77-700, 1977.

LABORATORY ANALYTICAL DATA

NW SE S22
PA NO. 49-003

MDSL AMRB/PIONEER 4/9/93

NW Section 22 PA# 49−003
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BULLOCK
INVESTIGATION DATE: 08/11/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
49−003−WR−1	329	196 J	4.05 J	17	15.6	125	42900	0.125	1780	30.5	1660	5.54 J	745	NR
BACKGROUND	16.3	78.3 J	0.68 J	13.5	45.6	40.1	28500	0.063	612	24	37.2	7.97 UJ	99	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
49−003−WR−1	1.05	32.8	10.2	−22.6	0.24	0.17	0.64	5.31	4.88

LEGEND

WR1 − Composite of subsamples WR1A and 2A.
BACKGROUND − From the Poor Man/Emma Mine (49−001−SS−1).

XRF ANALYSIS RESULTS

NW SE S22
PA NO. 49-003

Mine Name: NW Section 22 PA# 49-003
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
49-003-WR-1		13359.6	20077.3	1889.41		2144.13	46526.1	368.536 *		259.029	88.9508 *	771.898
49-003-WR-1-COMP		17159.3	9265.61	1534.52		3187.94	50666.1		91.4474 *	631.064	217.811 *	401.509
49-003-WR-2		28141.2	3563.88	1080.15	190.788 *	5105.82	49111		98.8383 *	1213.51	160.338 *	91.9179

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
49-003-WR-1	74.1145			103.31	68.4568			801.622			17.2897 *
49-003-WR-1-COMP	79.752		4.87799 *	1124.34	137.19			923.513			15.9707 *
49-003-WR-2	131.728		9.77805 *	2384.67	237.457			1417.14			27.7673 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

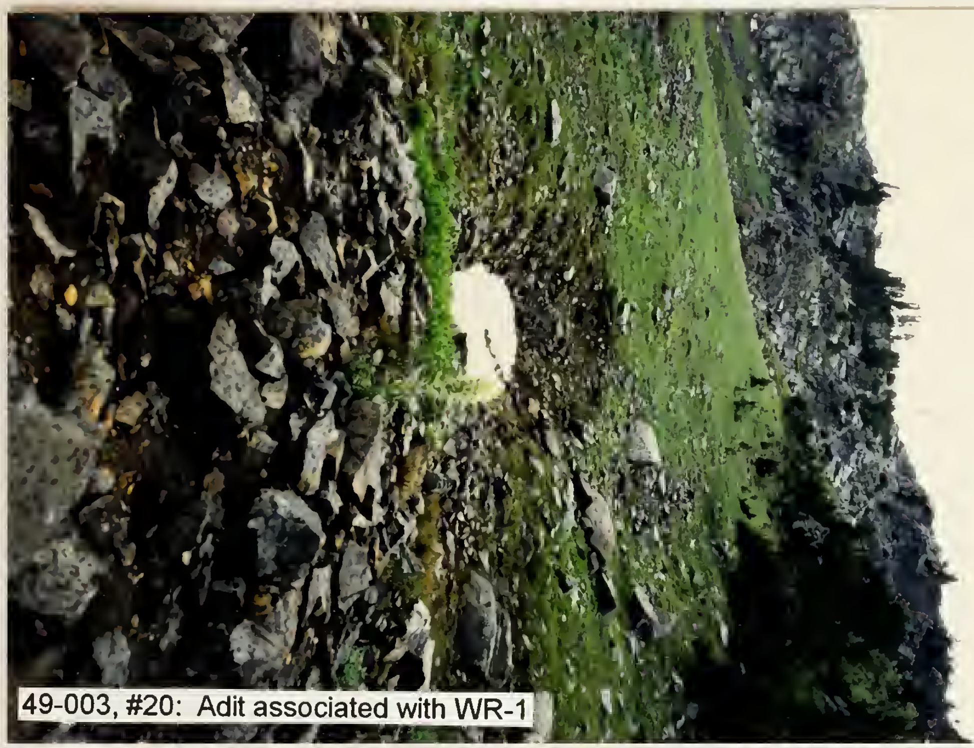
NW SE S22
PA NO. 49-003

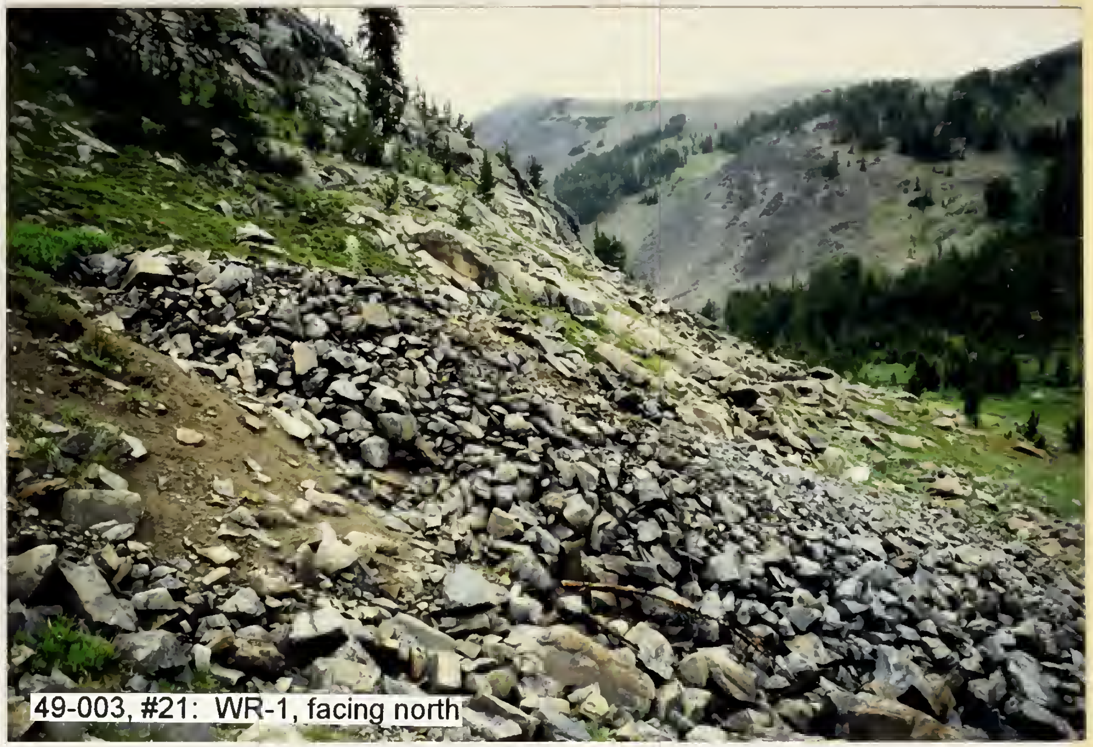
AIMSS SCORESHEET

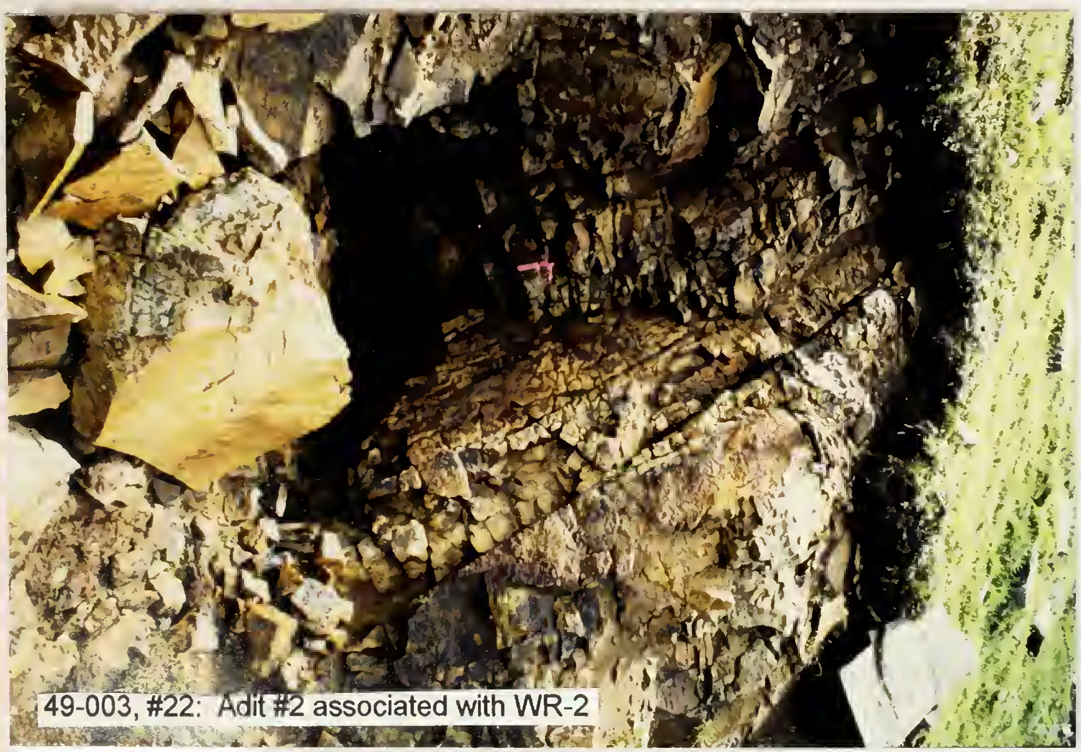
SITE NAME: NW SE S22
PA NUMBER: 49-003

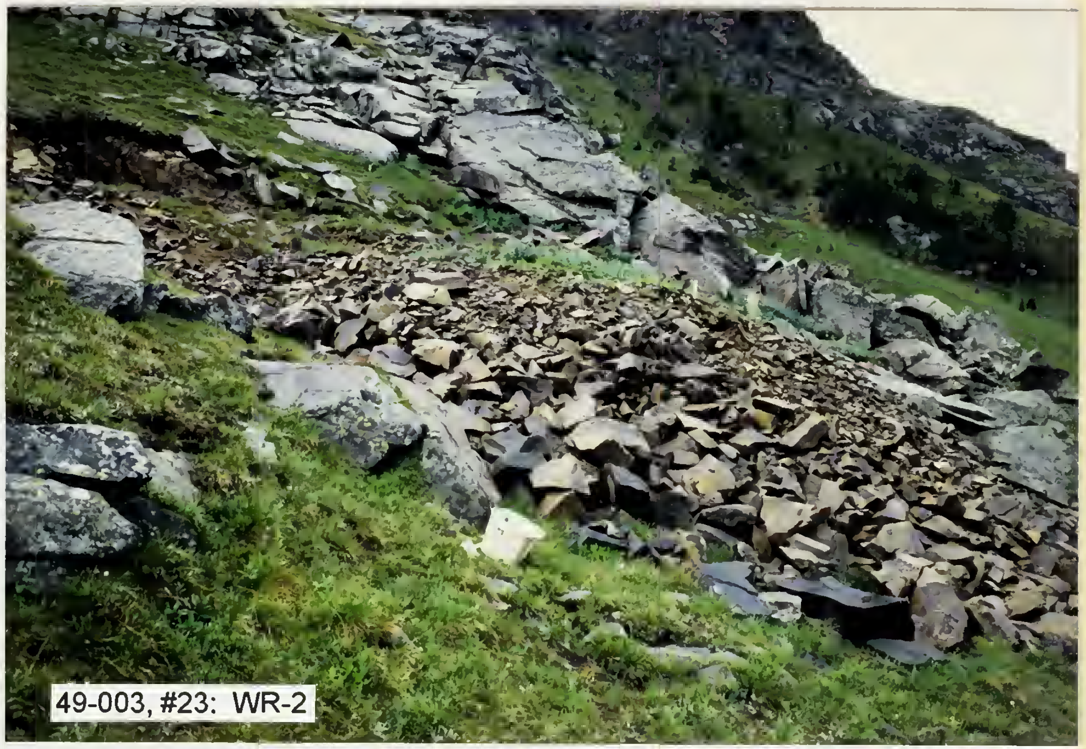
LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.058
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		0
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	0.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.064
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		0
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	7
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	18
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		1
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	5
27		LIKELIHOOD SCORE	LINES 25 + 26C	5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.021
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	11
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.020
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		0.00

				SITE NAME:	NW SE S22
LINE NO.				PA NUMBER:	49-003
		SITE SAFETY			
1	THREAT	ACCESSIBILITY			10
2		OPEN SHAFTS	100 EA.		0
3		OPEN ADITS	50 EA.		50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.		0
5		HAZ. STRUCTURES	40 EA.		0
6		EXPLOSIVES			0
7		HAZ. MATERIALS			0
8		HAZARDS SCORE	SUM LINES 2 THRU 7		50
9		POPULATION - 1 MILE			0
10	TARGETS	NEAREST RESIDENCE			0
11		RECREATIONAL USE			0
12		TARGETS SCORE	SUM LINES 9 THRU 11		0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000		**0.00**


49-003, #20: Adit associated with WR-1


49-003, #21: WR-1, facing north


49-003, #22: Adit #2 associated with WR-2


49-003, #23: WR-2